COAL AGE

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Organizing the Coal Industry

By FLOYD W. PARSONS

MANY people have believed that the production and national distribution of coal could not be systematized. There was good reason for entertaining this idea, because no commodity enjoys wider use or comes more generally into daily life than does the fuel production of our 8000 mines.

The Fuel Administration in Washington, however, some months ago determined to know just where all the coal goes, and this ambitious plan is on the way to a happy and useful realization. Very soon all consignees who receive as much as one car of coal per month, or approximately 500 tons per year, will be required to report regularly all receipts, disbursements and consumption of fuel.

At the commencement, the Fuel Administration will receive about 100,000 reports weekly. This will cover approximately 90 per cent. of our production. The remaining 10 per cent. will be cataloged a few weeks later.

Before snow flies again, Dr. Garfield and his associates will have definite figures showing the production and consumption of coal in every zone, and these data will enable them to shift coal promptly from one region where there is an abundance to other districts where a shortage exists.

With an equitable car supply, and such complete data covering fuel requirements, it is now a certainty that we will have far greater efficiency in coal distribution than ever before. It is not so likely that one region will have a feast and another a famine.

The Government will have absolute control of the Nation's industries through its power to dispense fuel. Less essential industries will not get coal that war plants need. It is because of this fact that hundreds of businesses must either seriously curtail output or substitute war work for peace work.

Every 3-in. shell that we fire on the battle front in France means a consumption of 80 lb. of coal. When artillery bombardments are intense, it is not unusual to fire enough shells at a single point to consume 7000 tons of coal per hour. One recent battle lasting several months consumed more coal than we will produce in all of the mines of Tennessee this year. To build one 8000-ton cargo ship requires 16,000 tons of coal. We plan to build hundreds of these ships this year, so it is evident that this work will demand a large quantity of fuel.

War is a new business with us, but it is already our chief business. We must adapt our lives to a new order of things, and to this end let us supply the Nation with sufficient coal to avoid any lack in the necessary sinews of war. This is no ordinary occasion, and we can only win by putting forth the last ounce of energy that is in us.

IDEAS AND SUGGESTIONS

Combination Signal System

BY ELECTRICAL ENGINEER
Lafayette, Colo.

The use of primary batteries for operating signal bells is common practice; alternating current at 110 volts is not considered successful unless the bells are specially wound; the use of direct current at various voltages through a set of lamps is in use to some extent. A signal-bell system that is arranged to work on any one of these three sources of supply by simply changing certain switches is especially interesting. Such an arrangement and one that is working successfully, is shown in Fig. 1.

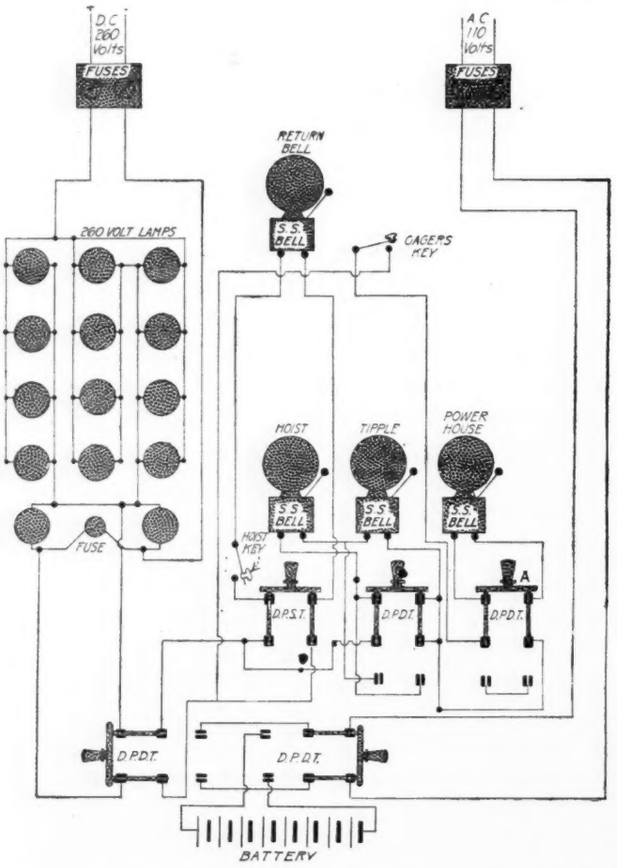


FIG. 1. SIGNAL-BELL SYSTEM THAT OPERATES ON ONE OF THREE SOURCES OF SUPPLY

This system has been in successful operation for years at one of the large coal mines in Colorado. The mine in question is a shaft, and the signal board is located in the hoistroom. The bell and the ringing key are also located in the hoistroom. Another bell is located at the top of the tipple where the cage and cars of coal land. One bell and a strap key for signaling is located at the bottom of the shaft for the use of the cager. Another bell is placed in the power house. This is generally cut out of circuit by the switch *A* and is only used when the engineer who attends to the power house as well as the running of the hoist is attending to that part of his duties. This bell will then warn him when he is wanted at the hoist.

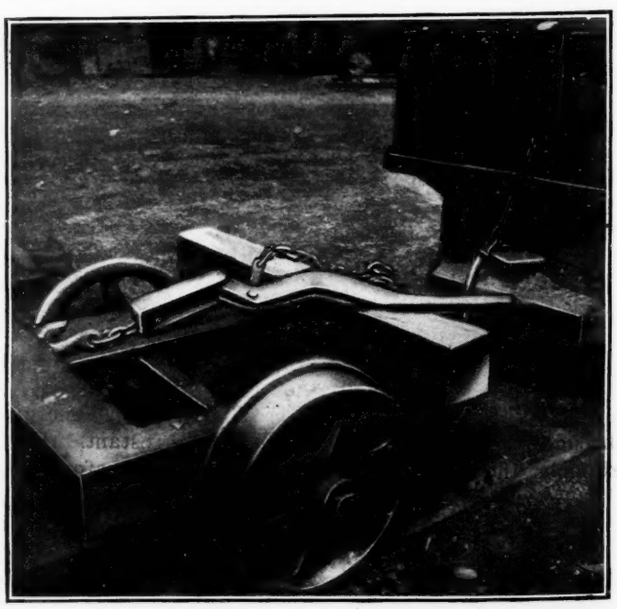
The bells used are all single stroke and are fitted with 8 and 10-in. gongs. The electro-magnets are wound with No. 18 double cotton-covered magnet wire. The results obtained are a quick, clear ring with each pressure on the keys. The system generally in use is shown in Fig. 1. The system is here shown operating on direct current.

Self-Locking Pipe and Timber Binder for Slope Car

BY R. W. MAYER
Connellsville, Penn.

The American Zinc and Chemical Co., at Burgettstown, Penn., handles rails and pipes in its mine on a special car which was built for that purpose. This car has no box, only a framed platform on the axles of the car. A special binder is provided, to hold the load of pipes or rails in place on the car, the load being bound at the front and rear of the car.

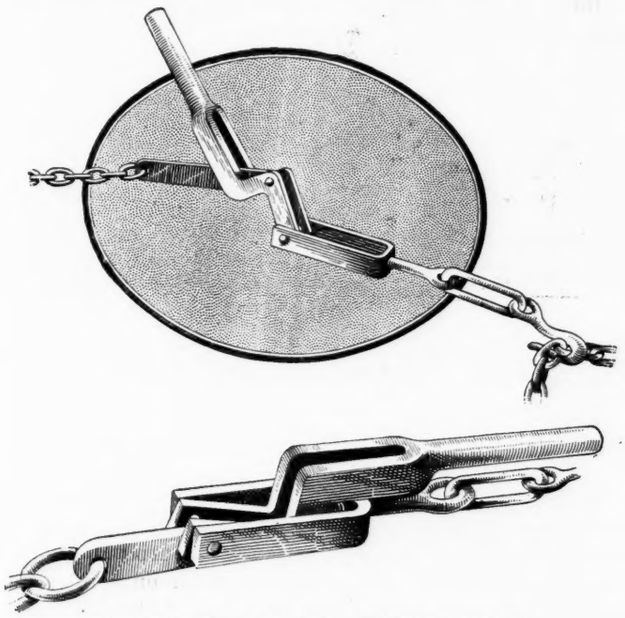
The binder proper consists of a self-locking lever carrying a grab hook. This grab hook is attached to the lower end of a clevis by means of a link and swivel; a slotted and properly bent hand lever is attached to the open end of this clevis by means of bolts or rivets; at the first bend of the lever a strap link connects the



BINDER HOLDS LOAD OF PIPES AND RAILS IN PLACE ON A SPECIALLY BUILT CAR

lever to the chain attached to one corner of the truck; the lever terminates in a suitable hand hold. The link last mentioned is long enough to reach from its point of attachment to beyond the end of the lever and is free to move between the two lever prongs. The clevis also is sufficiently long and wide to permit the lever at the bent portion to swing between its sides.

In operation, after the load of pipe, rails, pit lumber, or other material has been placed upon the truck, the



DETAILS OF PIPE AND TIMBER BINDER

chain from one corner of the car is brought up and over the load. The chain from the opposite side, as has been stated, carries at its extremity the binder terminating in the grab hook. This hook is attached to any convenient link of the opposite chain and the hand lever then moved downward toward the clevis. This, of course, shortens the loop of chain encircling the load, and when the bent portion of the lever passes the center line of the clevis the device becomes self-locked. The load is thus securely bound to the truck. When it is desired to remove the load a pull upward on the lever unlocks the binding so that the grab hook may be unfastened.

Bell-Ringing Transformers to Serve Signaling Devices

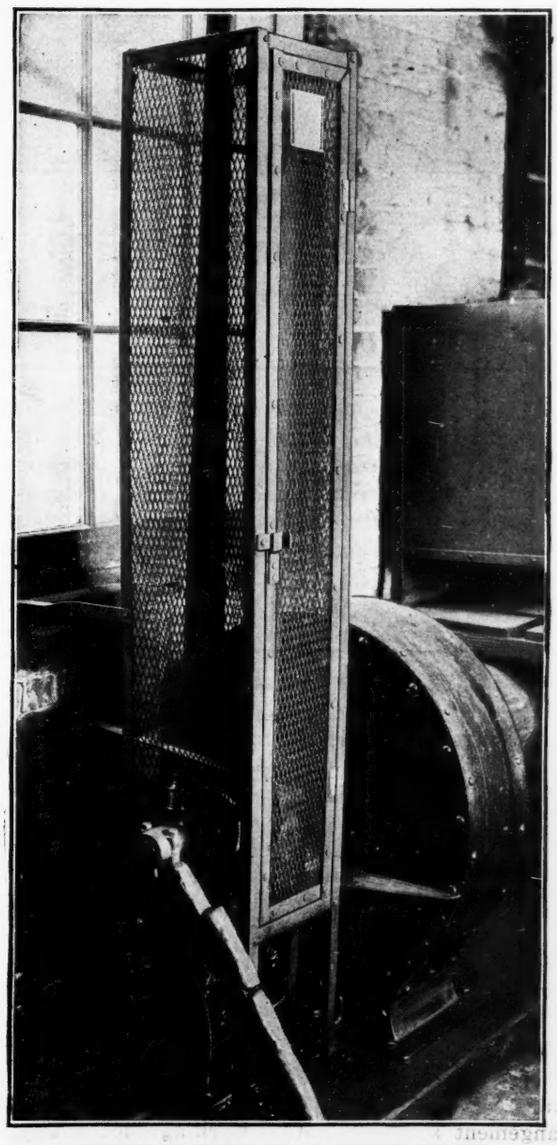
BY H. O. GRAHAM

Any reasonable number of electric signaling bells or annunciators may be served from one bell-ringing transformer, provided the circuits are so arranged that not many of the signaling devices will be taking energy through the transformer at the same instant. For example, the ordinary small bell-ringing transformers that are used in the average house-wiring installation will usually satisfactorily serve simultaneously two or three electric bells, or devices requiring an approximately equivalent amount of energy. Larger bell-ringing transformers can be purchased that will serve simultaneously six, seven, or even possibly a dozen ordinary signaling devices.

Convenient Machine Guards

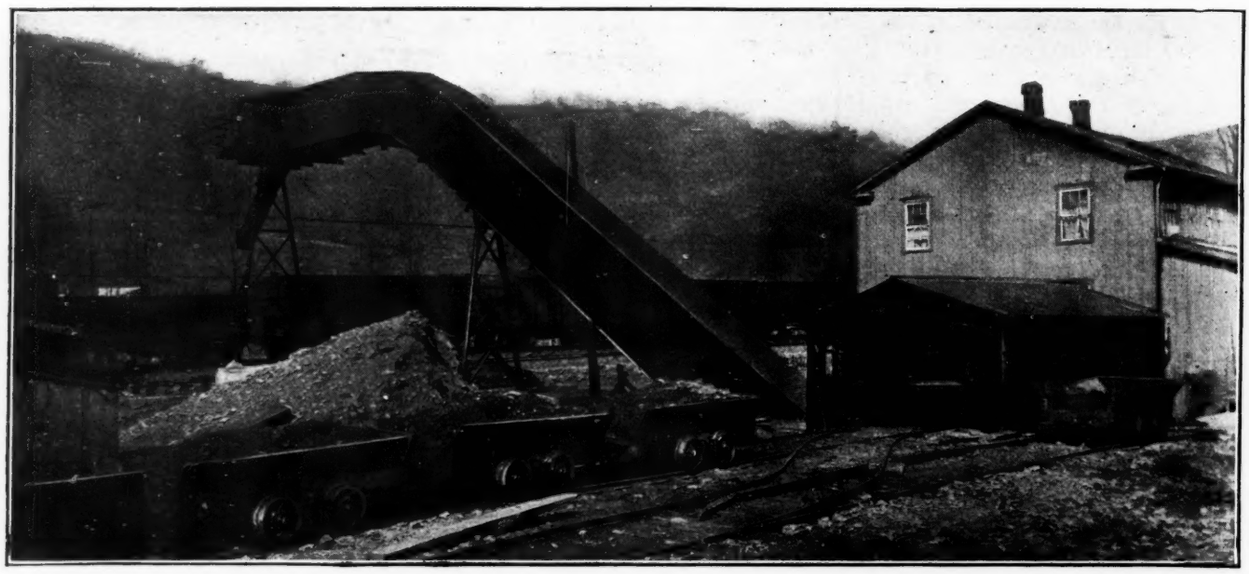
The guarding of belts, flywheels and other moving machine parts has received considerable attention at coal mines and various industrial plants during the past few years. The materials from which guards have been constructed have ranged from pine boards to steel or iron castings. The ideal guard, however, is one that is light, strong, easily removable either in whole or in part, and does not shut off or seriously obstruct the view of the moving parts shielded.

The accompanying illustration shows one of the most efficient types of guards yet devised. It consists of an angle-iron frame over which expanded metal is stretched



EFFICIENT TYPE OF MACHINE GUARD

and fastened securely. It will be noticed that one side of the guard here shown is a hinged door that may be opened easily, thus affording ready access to the belt that is inclosed. The journal oil cups are outside of the guard. The machine may thus be oiled and inspected without disturbing the belt guard. The guard may be entirely removed at any time should occasion require that this be done.



Coal Tipple for Small Operations

By H. B. MOSLEY
Philadelphia, Penn.

SYNOPSIS—*An extremely simple and inexpensive tipple for run-of-mine coal is here described. This consists essentially of a dump at ground or drift level and a scraper conveyor elevating and conveying the coal across a trolley track and highway and discharging it into railroad cars. A few slight changes would enable this tipple to make two or more sizes.*

BECAUSE of the increased demand for coal, the general shortage of labor and the Government-fixed price, it has become essential for the small operators to work on the most efficient basis possible and with the smallest amount of help.

The purpose of this article is to describe to some extent, at least, means by which the small operator (who cannot afford or who is not warranted in the expenditure of a large sum of money for a modern coal tipple) can handle his coal with the minimum amount of labor and at the least cost.

At the Paul & Dailey Coal Co., Western Port, Md., where coal is found outcropping in various beds up the hillside, a system for the mechanical handling of coal from mine cars to railroad cars has recently been installed and found quite satisfactory, not only in operation and maintenance, but in the man power saved.

At this mine mules are used to pull cars of coal to the mouth of the drift. This is driven in the lower coal bed, known as the "split six," being 6 ft. of fine grade bituminous coal split in the middle by a rock binder 1 ft. thick. From the mouth of the mine the cars are taken over a scale and weighed. First, however, the mules are unhitched and taken back into the mine.

After the cars are weighed they are sent down a slight incline and discharged by means of an automatic dump into a receiving hopper. The empty cars are switched to another track and sent down grade to the entrance of the mine again. It was the original intention to have the scale housed in the same building with the receiving hopper and automatic dump, but this meant that both loaded and empty cars would have to pass over the scale, so the other method was adopted.

The receiving hopper is 10 x 12 ft. in plan and built of $\frac{1}{4}$-in. steel plate, securely stiffened with angles. This hopper is attached to the sides of a concrete pit by bolts set in the concrete. The housing over the hopper and the automatic dumper is of light steel, "angle-iron" construction, sheathed with No. 22 gage galvanized corrugated iron.

From the receiving hopper the coal is fed into a flight conveyor by a reciprocating feeder. This feeder consists of $\frac{3}{16}$-in. side plates 18 in. high, attached to the outlet of the hopper, and has a $\frac{1}{4}$-in. plate bottom to which is attached shafts and rollers on which it reciprocates. These rollers travel on angle-iron tracks which are hung from the feeder sides by cast-iron brackets. The feeder plate is driven by means of a wristplate and pin and eccentric rods which are actuated by a substantial chain drive from the tail end of the conveyor.

The conveyor is built of two strands of 9-in. pitch steel roller chain having $\frac{3}{8}$ x $2\frac{1}{4}$-in. side bars, $\frac{7}{8}$-in. pins and 3-in. hard cast-iron rollers at each joint, between which are attached at 18-in. intervals $\frac{3}{16}$-in. steel plate flights, 10 in. high by 20 in. wide. This chain has an ultimate strength of 50,000 lb., but is rated at 2300 lb. working strength by the builders. The flights are built of a single piece of plate flanged back on both sides and securely attached to the chain. This makes a rigid and serviceable flight.

The carrying run of the conveyor operates in a steel trough having 9 in. x $13\frac{1}{4}$-in. channel sides and $\frac{3}{16}$-in. plate steel bottom. The bottom plates are bolted in place and in case of appreciable wear new ones can readily be substituted. Angles 4 x 3 x $\frac{5}{16}$ in. are

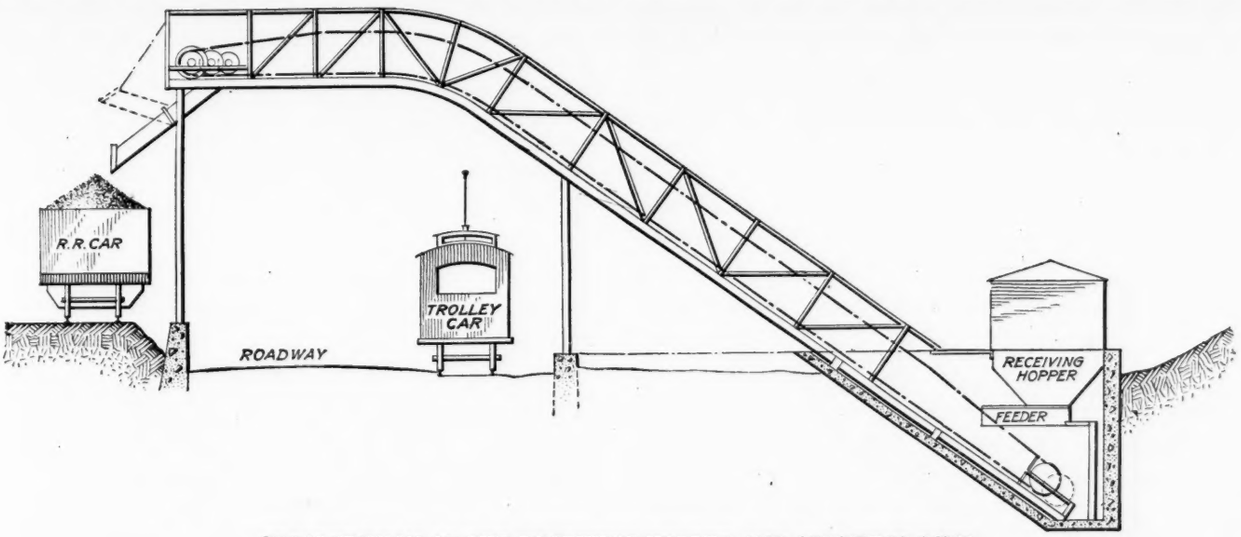
countersunk and riveted to the upper flanges of the trough channels for the chains to roll upon, also to form part of the bridge which spans the roadway. The return run of the conveyor also travels on 4 x 3 x $\frac{5}{16}$-in. angles, which serve as the upper chord of the conveyor bridge. All shafts of the conveyor were designed for both torsion and bending, allowing a combined unit stress of not over 11,000 lb. Bearings are of the rigid babbitted type, fitted with compression grease cups.

A 10-hp., 1100-r.p.m., Westinghouse, constant-speed, continuous service, open-type motor is connected to the conveyor countershaft by means of a cast-iron cut spur gear and brass-bound rawhide motor pinion. A light steel-plate motor box was used to cover the motor and automatic starter, while gear guards of the same material surround all gearing to protect the attendant.

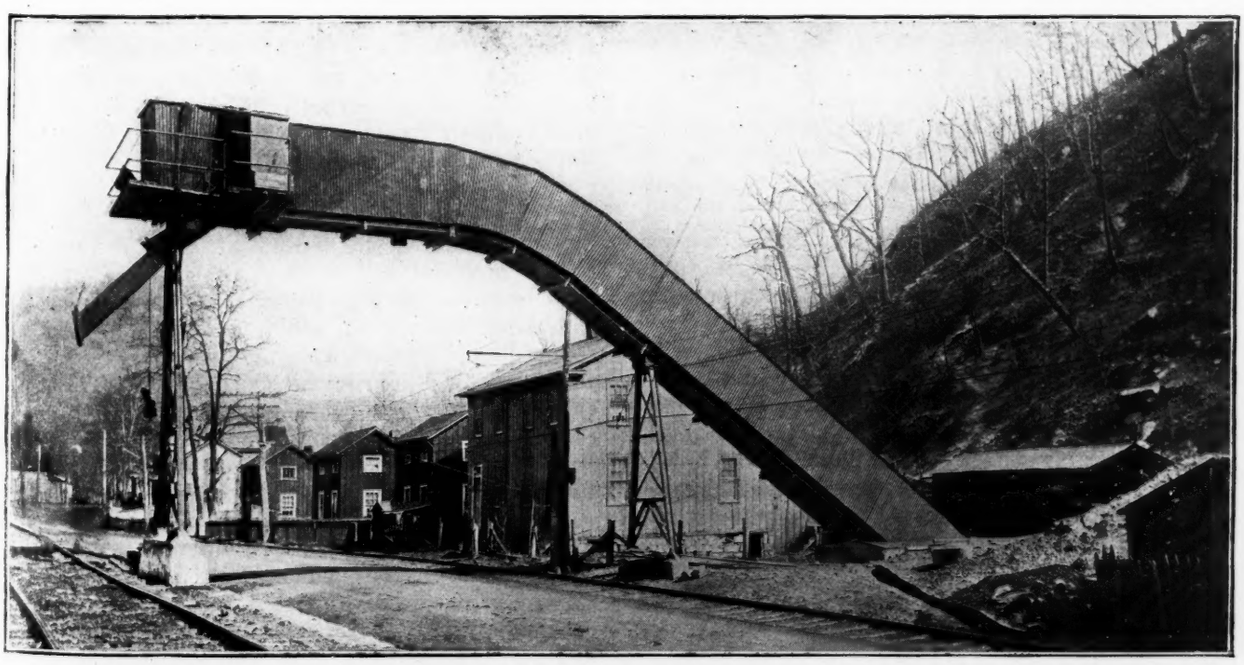
Push-button stations for controlling the conveyor are located at the conveyor receiving hopper, at the discharge chute and at the mouth of the mine. The conveyor carries the coal up an incline of 30 deg. and horizontally over a highway at a clearance height of 21 ft. from the crown of the road and discharges it into a chute which deposits the coal in railroad cars at the rate of 70 tons per hour. This fills the average size of car in about 45 minutes.

The discharge chute is 18 in. square, built of $\frac{1}{4}$-in. steel plate, and is hinged to fold up in order to give necessary railroad clearance. An ample counterweight is provided so as to make the raising and lowering of the chute simple and easy.

From the ground a footwalk 24 in. wide, built of 2-in. plank, is provided extending up the incline and along the horizontal portion of the conveyor on one side. Wood cleats are furnished on the inclined portion to assist the attendant in walking up. A platform is provided around the driving machinery to give easy access to the lubricating grease cups. A double run handrail 42 in. high, built of $1\frac{1}{4}$-in. black pipe, incloses the footwalk and



CROSS-SECTION OF THE RECEIVING HOPPER AND CONVEYOR LINE



SIDE VIEW OF TIPPLE, SHOWING ITS GREAT SIMPLICITY

platform on the outer side. This layout shows what can be done for the small operator who is at all times hard pressed for labor to transfer coal from mine cars to railroad cars. The equipment would be even less expensive if there were no highway to carry the material across, and it was only necessary to elevate the coal to railroad cars. Again, if the cars are far away, it is an easy matter to lengthen the conveyor and supporting bridge.

If it is desired to screen the coal before loading it for shipment, the trough bottom plate may be perforated to the desired size and all material passing through the screen plate would enter a screenings hopper from which it would be drawn by a gate at the bottom. A screen of this type can also be arranged in the chute to the railroad cars, this being a favorite method of finally screening all breeze from coke before it goes to the ultimate consumer.

Many modifications of a plant of this type can be worked out and all be thoroughly practical. It is therefore believed that the small operator will soon appreciate the opportunity for mechanical handling equipment for coal after it has reached the mouth of the mine. This will relieve a large number of men for work in the mines themselves, or at some other place where they are more urgently needed.

The complete equipment described was furnished by the R. H. Beaumont Co., of Philadelphia, Penn., which specializes in coal, coke, and ash handling equipment.

Educating the Small Mine Owner to the Value of Engineering

By O. H. Hampsch
Washington, D. C.

The matter of engineering in small mines is often a neglected factor. I say small mines, for most of the larger companies have one or more engineers whose work it is to look after and solve the engineering problems that arise. But by many of the smaller companies it is deemed an unnecessary luxury to hire an engineer.

It is quite true that many small companies may not be justified in keeping an engineer when development is slow and a small tonnage is produced, but often such companies may jointly keep a man, allotting so much of his time to each mine (this amount depending upon the speed of development) or using his services at regular intervals.

The value of keeping entries and rooms on sights needs no argument, for I think anyone will agree that it is worth the time and money spent. Such a procedure results not only in maximum recovery, smaller air resistance and compactness of mine workings, but regular and even pillar supports tend to lessen squeezes and loss of territory and increase the value of a mine. One's opinion of crooked entries and diverging rooms in a mine is the same as his opinion of a town or city with crooked and winding streets and lots to correspond. Many operators consider the state survey that is required by law annually or semi-annually a sufficient amount of engineering, and many would not do even this if it was not compulsory. This reminds one of surveying a railroad after it is built.

In most cases the majority of these problems are taken care of partly by foremen in charge with the aid of a Brunton pocket compass. This is wholly inadequate for accurate work because of rails, pipes, cars, etc., which in every case will cause an erroneous reading or bearing and render it impossible to run straight entries or compute with accuracy the distance to a boundary line. Accurate transit or vernier surveys of a coal field, and tied to a complete underground survey, is the only kind that should hold in a dispute or lawsuit over boundary lines of relative location of underground workings. Many a mine owner has been agreeably or disagreeably surprised to find just where he actually is, often having mined for several years as a mole burrows through the earth, taking the line of least resistance. The cost of an encroached property or a lawsuit springing therefrom, not considering the ill feeling between land owner and operator, would often pay for the services of an engineer for a year or more.

On main entries and other passages where haulage is continuous or heavy, profiles should be run and plotted. From these the exact locations of hills or sags in the road bed and necessary cuts or fills for an ideal grade can be determined. This is quite a factor in haulage and amounts to much, whether the haulage be by mule or motor power. The user of profiles where entries are wet or water flows is of considerable value for ditching or determining the location of pumps and sumps. Often by careful grading a gravity flow can be obtained.

Entries driven off main entries or at a point where two entries diverge should be started on a curve ranging from 50 to 150 ft. in radius, depending upon the speed and kind of haulage. This eliminates considerable friction, makes an easier pull for haulage power and decreases the danger of loaded cars leaving the tracks. Care should be taken as the underground workings progress to watch the location of wells, springs, creeks, etc., especially when there is but little cover overhead, in order that these do not affect the mine through leakage; also the location of important or heavy buildings, railroad tracks and the like, leaving, if necessary, a reserve block of coal to support them.

I believe that as mineral rights become more valuable and efforts are made to improve the methods of mining, the value of starting and developing a mine on well planned, sound engineering principles will be more and more realized; and the day will come when an engineer will be as necessary to a mine as to a railroad or city.

Antiseptic Value of Peat

Peat produced by the decomposition of sphagnum moss is so antiseptic and absorbent that it is used as a dressing for wounds and is an excellent substitute for medicated cotton. This fact was recognized many years ago in Europe, where sphagnum peat is now extensively used in preparing surgical dressings. According to Professor Soper, who has made a detailed study of the peat deposits in northern United States, there are many square miles of sphagnum bog in the northern counties of Minnesota, Wisconsin and Michigan that would supply material suitable for antiseptic applications. It will not be necessary to incur the expense of deep excavation, for immense quantities of sphagnum can be taken from the upper parts of the deposits. Sphagnum peat is also abundant in Maine, and some is found in New York and Pennsylvania.

Exhaust-Steam Turbine Installations at Coal Mines—I

By E. I. ROBERTS
Cardiff, Alberta

SYNOPSIS—*An opportunity for making a considerable saving in fuel consumption exists at many coal-mining plants in the shape of a low-pressure turbine drawing its steam supply from other units. Such a machine of course necessitates the installation of considerable auxiliary apparatus, but the economies possible sometimes amount to as much as 100 per cent.; that is, the power reclaimed from exhaust steam sometimes equals the power generated by the live steam.*

THROUGH the conditions brought on by the war, and a closer adherence to efficiency methods, the attitude of coal companies with reference to the coal burned at their own plants is changing. In the past the majority of the operators considered that mine-run, nut or even egg coal cost them nothing and, in consequence, any of these sizes were used at the plant. The boilers were usually hand-fired, and often this was done by men who were good coal shovelers but poor firemen.

The coal was moved by hand into the boiler house and there unloaded, again by manual labor. All of the ashes were loaded and taken from the boiler house and dumped by man-power. Still the operator considered that the coal cost him nothing. Today we see a change. The tendency is to use the smallest sizes, to burn this with stokers, to handle the coal to the boiler plant with conveyors, and to distribute the ashes with the same appliances. Some coal companies go still farther. They install water-tube boilers, water-softening plants, superheaters and turbines, so that their mines may be electrified as far as possible. These latter features have been, and are still, considered in some fields as unnecessary refinements at any place except a large power plant. There is one method, however, which would at once make a decided gain on the profit side of the balance sheet of any average mine power plant. This is the installation of an exhaust-steam turbine unit. It is with this latter piece of apparatus that this article deals.

Considering the charts, Fig. 1, which show the heat used from the coal in plants employing ordinary engines alone, and again, using exhaust-steam turbines in addition, it will be seen that for the same fuel value the power produced is increased 70 per cent. Considering also that the total quantity of heat available from coal is around 9 to 10 per cent. at the average coal plant, the extra saving is an appreciable factor to any coal company.

In the first case let us assume that steam is to be drawn from high-speed reciprocating units, using steam at the rate of 27 lb. per i.hp.-hr., while the rating of the exhaust steam turbine is 30 lb. per i.hp.-hr. Further we will assume that the high-speed units consume 15,000 lb. of steam per hour. This gives $\frac{15,000}{27} = 555$ hp. Of this 15,000 lb. of steam used we allow 20 per cent. lost in condensation, and elsewhere, thus giving us 12,000 lb. available for the turbine. This gives $\frac{12,000}{30} =$ 400 hp. From this we subtract 7 per cent. for the driving of auxiliaries, for forming the vacuum for the turbine. This amounts to 28 hp., which leaves 372 hp. net from the turbine, or an increase of 67 per cent. in power derived from the same quantity of steam generated by the boilers.

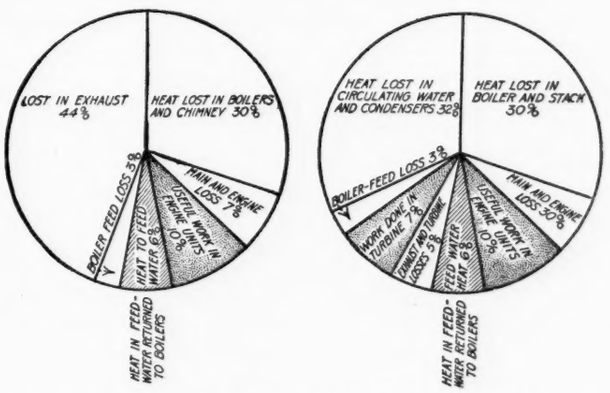

LOST IN EXHAUST 44%
HEAT LOST IN BOILERS AND CHIMNEY 30%
BOILER FEED LOSS 3%
MAIN AND ENGINE LOSS 7%
HEAT TO FEED WATER 6%
USEFUL WORK IN ENGINE UNITS 10%
HEAT IN FEED-WATER RETURNED TO BOILERS
HEAT LOST IN CIRCULATING WATER AND CONDENSERS 32%
HEAT LOST IN BOILER AND STACK 30%
BOILER-FEED LOSS 3%
MAIN AND ENGINE LOSS 30%
WORK DONE IN TURBINE 7%
EXHAUST AND TURBINE LOSS 5%
FEED WATER HEAT 6%
USEFUL WORK IN ENGINE UNITS 10%
HEAT IN FEED-WATER RETURNED TO BOILERS

FIG. 1. UTILIZATION OF HEAT IN POWER PLANTS

If the hoist, steam pumps and general steam-consuming units around the mine are of the simple noncondensing engine type and less economical in steam consumption than has been assumed above, a still further saving can usually be made by the installation of a unit using the exhaust steam. This additional saving may at times amount to as much as 100 per cent.

In the second case let us assume a plant uses saturated steam at the rate of 40 lb. per i.hp.-hr., and the turbine at the rate of 30 lb. per i.hp.-hr., and that 20,000 lb. per hour is the quantity used in the simple noncondensing units. Then allowing 20 per cent. for condensation and loss in cylinders, piping, etc., 16,000 lb. will be available for the turbine. The power developed by the simple noncondensing units is $\frac{20,000}{40} = 500$ hp., and that developed by the turbine $\frac{16,000}{30} = 533$ hp., subtracting from this 533 hp., 7 per cent. for the driving of auxiliaries, or 37.3 hp. for rough figuring, say 37 hp., leaves 496 hp. from the unit using the exhaust steam. The total increase over and above the live-steam units is then 99.3 per cent., or roughly 100 per cent. increase in power for the same quantity of steam generated by the boilers.

It is in existing plants that the exhaust-steam unit will give the most advantage. New plants are being

designed and equipped with modern appliances to consume steam economically. Furthermore, during the early development of the mine insufficient exhaust steam is supplied by the live-steam units to operate a turbine; unless it is of the mixed pressure type, wherein live steam may be used during the periods when there is no exhaust steam.

The operation of a unit of this type, together with the condensers and auxiliary equipment, if properly installed is as simple as that of any reciprocating engine. It occupies less space, and if so installed that water cannot enter with the steam and dust is excluded from the bearings, is much cheaper in maintenance. There are other advantages to this type of unit. Thus, when a surface condenser is used with the turbine the condensed water may be returned to the boilers. This in itself is an item which covers a large ground at a mine plant. The cleaning of boilers, the bagging of sheets and the purchase of compound for the boilers in which mine water is used is an ever-present source of trouble while foaming and priming are constant dangers; also the corroding and pitting of feed-water pipes and boiler fixtures are a continuous source of expense. The returning of the condensate to the boilers practically eliminates these difficulties.

Even at plants employing condensing units there is a field for the exhaust-steam turbine. The exhaust unit being placed between the high-pressure machine and the condenser will enable at least 2 in. more of vacuum to be carried at the condenser, and this means about 10 per cent. more power from the steam. It is impossible to increase the vacuum to this extent with the known reciprocating engines, as air leakage prevents a vacuum higher than about 26 in. referred to a 30-in. barometer.

Passing from the preliminary considerations to the design and erection of such a unit at a coal-mining plant, we will consider in succession the steam available, the turbine specifications and the auxiliaries that are necessary for a 500-kw. mixed-pressure turbine driving a direct-current generator of this size.

We will first detail the equipment, from which data were taken for the actual driving of a unit of this size. This is shown in the following table:

Unit	Size	Cutoff	Speed	Hp.	Time Operating at	Per Cent. Load	Quantity Steam, Lb.
Hoist (twin)....	24x36	5/8	90	510	3/10 (see other details)	100	12,240
Shaker engine...	14x18	1/2	80	71.5	Full time	66	1,920
Roller screen engine.....	10x20	1/2	75	38	75 per cent.	75	860
Fan engine.....	14x20	1/2	70	62.5	100 per cent.	87	2,200
Shop engine.....	5x10	3/8	175	10	100 per cent.	75	300
Pump No. 1....	14x18	1/1	250 gal. per min.		250-ft. head	100	1,000
Pump No. 2....	12x 7	1/1	200 gal. per min.		40 ft. head	100	120
Holmes car lift..	14x18	1/1	3 trips per min., 40 hp.			.....	1,600
Total steam at 40 lb. per hp. equals.....							20,240

The gage pressure at the boilers is 110 lb. normal, with a 10 per cent. variation up or down. The proper way to ascertain the steam consumption of the various units is by means of an indicator. Lacking this, however, the quantity used by any of the units may be calculated as follows: Roller Screen Engine—The boiler pressure as 120 lb., a line drop of 10 lb. gives us 110 lb. gage at the engine. With ½ cutoff the mean effective pressure will be approximately 80 lb. This is calculated from the following formula: $0.9\ [k(p + 14.7) - 17]$ equals the mean effective pressure where k is 0.847 for ½ cutoff and p is the gage pressure at the engine. Then the horsepower equals

$$\frac{80 \times 1.66 \times 78.54 \times 75 \times 2 \times 0.8}{33{,}000} = 38\ hp.$$

This engine works at three-quarters of its load, giving 28.5 hp., and during three-quarters of its time. This gives 28.5 × 40, which equals 1140 lb. of steam per hour at full operating time and 855 lb. for three-quarters operating time. In the foregoing table this is considered as 860 lb. of steam per hour, which closely approximates the calculations.

While in the preceding calculations the steam consumption has been figured at 40 lb. per hp.-hr., it must be remembered that the steam consumption is often as high as 60 lb. per hp.-hr. The water rate for an exhaust-steam unit varies from 36 to 46 lb. per kw.-hr. Assuming then an average of 40 lb. of steam per kw.-hr., the total quantity of steam as shown, and not allowing for condensation losses, would give enough steam to generate 500 kw. It was found ultmately at this particular plant, that, owing to a steam consumption greater than 40 lb. per hp.-hr. of some of the units, the exhaust line and cylinder condensations were easily covered in the calculations.

In Fig. 2 will be seen the electrical load that was carried by the turbine-driven generator, with admission of live steam above the full load line. The hoist and the Holmes car lift give a fluctuating exhaust, that is, steam is admitted to the hoist for 6 sec. per trip and no steam for 14 sec. This will be taken care of by a regenerator, which carries the steam over the idle period, giving it out as required by the turbine.

Having decided that the steam available is sufficient to warrant the installation of a 500 kw. unit, we will next consider the type to employ. There are two types of

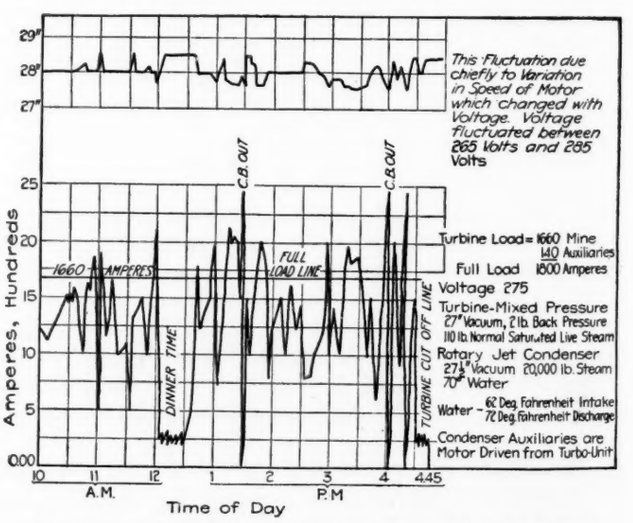


FIG. 2. ELECTRICAL LOAD ON THE PLANT AND THE VACUUM

turbines adaptable to this class of service. These are the low-pressure and the mixed-pressure machines. The first type, as the name implies, is operated entirely on low-pressure steam, and if an insufficient supply is available for operating this class of unit, under all conditions, a reducing valve has to be installed so that the live steam may be reduced from the boiler pressure to the 2 or 3 lb. pressure required by the turbine. This, of course, is

not efficient, but satisfactorily enables a low-pressure unit to be employed.

The mixed-pressure unit is equipped with two kinds of blades, one for the live steam and the other for the low-pressure steam. In some cases the blades are such that both the live- and low-pressure steam can be used on the same blading. The admission of the live steam is automatically governed, so that at a certain reduction in speed the governor opens the live-steam valve. The speed can thus be maintained with live steam when the low-pressure steam supply is insufficient to carry the load. When the load drops off, or the exhaust steam increases, the live steam is shut off automatically and the turbine operates entirely on the low-pressure steam until such time as the load exceeds that which can be carried by this supply. This is the class of turbine that is usually most suitable for mine purposes, since with the exhaust steam alone the turbine manufacturers will not guarantee the overload capacity from the turbine that the generator will carry momentarily. They will, however, do so with a mixed-pressure unit. This question, of course, is governed by local conditions.

The generator may be alternating or direct current, as required by the company's conditions, and may be connected either directly or through reduction gears. The transmission of power through modern high-speed reduction gears is quite efficient, so that this means of connection is no longer considered uneconomical. It is necessary, however, that the life of such gearing be specified and considered in the proposal from the manufacturers.

An outline of the specifications for an exhaust-steam unit suitable for coal mines, is as follows:

1. The turbine shall run smoothly and furnish the required power for full load of generator, at the rated speed, under any of the following conditions: Exhaust steam pressure, 2 to 4 lb. per square inch; vacuum, 27 to 29 in. of mercury referred to a 30-in. barometer. Overloads may be carried by live steam, automatically, at 110-lb. pressure per square inch, with a 10 per cent. variation below and above this pressure.

2. The unit shall run without undue noise, excessive wear or heating, and must be capable of running for long periods at full load.

3. The turbine to be of sufficient power when running at rated speed, to develop 1¼ times the rated full load of generator.

4. The valve gear shall work, automatically, over the total range of conditions, that is, operation from zero to 1¼ times rated load of generator, when operating under normal live-steam conditions of 110-lb. gage pressure per square inch, 3-lb. gage pressure exhaust steam, and 28-in. vacuum referred to a 30-in. barometer.

5. The turbine shall bear without injury the sudden throwing on or off of 1¼ times the rated load of generator, which may be brought about by the throwing out of the circuit breaker or other cause.

6. The speed variation shall not exceed 2½ per cent. when the load is varied between full load to 20 per cent. of full load, gradually or in one drop, the turbine operating under running conditions.

7. The speed variation shall not be more than 3½ per cent. when the load is thrown suddenly on or off under normal conditions.

8. A common sub-base shall be furnished for the proper mounting of the turbine, reduction gears (if any) and the generator, and planed projections shall be provided for leveling same.

9. The sub-base to be provided with bolt holes for foundation bolts, which bolts will be supplied by the coal company.

10. All external nuts, liable to frequent use, shall be case-hardened, and where they are liable to work loose shall be furnished with lock nuts. The seats for the bolt heads and nuts shall be faced.

11. The adjoining portions of the machine are to be given plain corresponding marks, for convenience in reassembling.

12. All necessary wrenches, lifting eyes, jacking bolts for removal of wheels, special tools, feelers, etc., are to be furnished by the turbine manufacturer.

13. Sufficient tests are to be made by the turbine manufacturer, at his own expense, to insure the proper conforming to these specifications. Two tests shall be made by the coal company at the plant after erection. Any repairs and defects developing at the first test at the plant shall be remedied before the second test and before final acceptance.

14. The live-steam inlet shall be equipped with an automatic emergency throttle valve, in such a way that it will automatically close with a 10 per cent. increase of speed above normal.

15. All flange drillings shall be standard, except the flange drilling for the live-steam connection, which shall be extra heavy drilling. Companion flanges shall be furnished where this is not done, and flanges shall be threaded for the size pipe that is called for on plans.

16. Forced lubrication is to be used on all bearings on which shaft pressure exceeds 20 lb. per square inch of projected bearing surface. In case of forced lubrication the oil is to be cooled by water in contact with coils through which oil flows. The coils and water-circulating system to have the connections outside of pedestal.

17. The upper and lower halves of main bearings shall be removable, without removal or displacement of the shaft.

18. Ball thrust bearings shall be used where necessary.

19. Provision shall be made in the construction of the complete machine so that the armature can be removed without excessive dismantling.

20. A pop safety valve exhausting to the atmosphere of a size sufficient to prevent an injurious back pressure arising in the turbine casing, due to a leaky throttle valve, shall be provided.

21. The assembled turbine is to withstand a hydrostatic test of 50 lb. per square inch, without showing undue stress or leaks.

22. Provision shall be made on all oil discharge from all bearings to observe the flow of oil from each bearing; and if bearings are also water-cooled, a similar provision for observation of cooling water flow shall be made.

23. An adjustable relief valve shall be furnished to protect the oil pump.

24. The oil tank is to be supplied with a sight gage and a ¾-in. bib-cock at lowest point to permit the withdrawal of the oil, and a cock shall also be supplied to permit the withdrawal of the cooling water.

25. Mandrels, with collars, complete, shall be furnished for renewing babbitt metal of all babbitted bearings.

26. The following gages shall be furnished: One 6-in. combination gage showing 30-in. vacuum and 30-lb. pressure; one 4-in. oil-pressure gage at oil pump; one tachometer for registering turbine speed.

27. An automatic device shall be furnished to break the vacuum in the turbine exhaust end when overspeed exceeds 10 per cent. above the normal operating speed, which device shall also control the live-steam throttle.

28. All workmanship on turbine shall be first-class, and appearance of the machine shall be as neat and as efficient looking as possible.

An outline of the specifications for the generator is given in the following:

1. Provision shall be made for vertical adjustment of magnet frame with bedplate.

2. Brush holders are to be staggered, so that wear over commutator surface may be even.

3. The shaft is to be provided with suitable means to prevent the oil from the bearings from working along the shaft to the commutator or armature.

4. Provision shall be made for the mounting of a commutator turning tool.

5. The field rheostat is to have a range of adjustment from 10 per cent. above to 20 per cent. below normal voltage.

6. The jump in voltage shall not exceed 15 per cent. when full load is suddenly thrown on or off.

7. The normal voltage to be ——— volts, compounding up from this, at rated speed, to ——— volts at full load.

8. The generator is to be able to carry a normal overload of 25 per cent. for two hours, with a temperature rise not exceeding 55 deg. C. on commutator and 50 deg C. in the windings and armature, at a room temperature of 70 deg. Fahrenheit.

9. The generator is to carry the rated full load of ——— amp., continuously, with a temperature rise not exceeding 45 deg. C. on commutator and 35 deg. C. in windings and armature, in a room temperature of 70 deg. Fahrenheit.

10. The efficiency of the generator is not to be less than as follows: ½ load, 88 per cent.; ¾ load, 90 per cent.; full load, 91 per cent. 1¼ load, 91 per cent.

11. An insulation test of 1500 volts alternating current shall be applied to all windings, and the windings shall not be punctured or broken down at this test.

12. The generator is to be compound-wound, and is to be provided with all necessary terminals for cables from switchboard.

13. Equalizer terminals shall be provided, and this generator is to parallel a generator having the following characteristics: Size, ———; voltage, ———; compounding characteristics, ———; driven by ———, etc.

(To be continued)

Increased Cost of Railroad Coal

The following table, prepared by Director General of Railroads McAdoo, strikingly illustrates the steady increase in the cost of railroad coal since 1915:

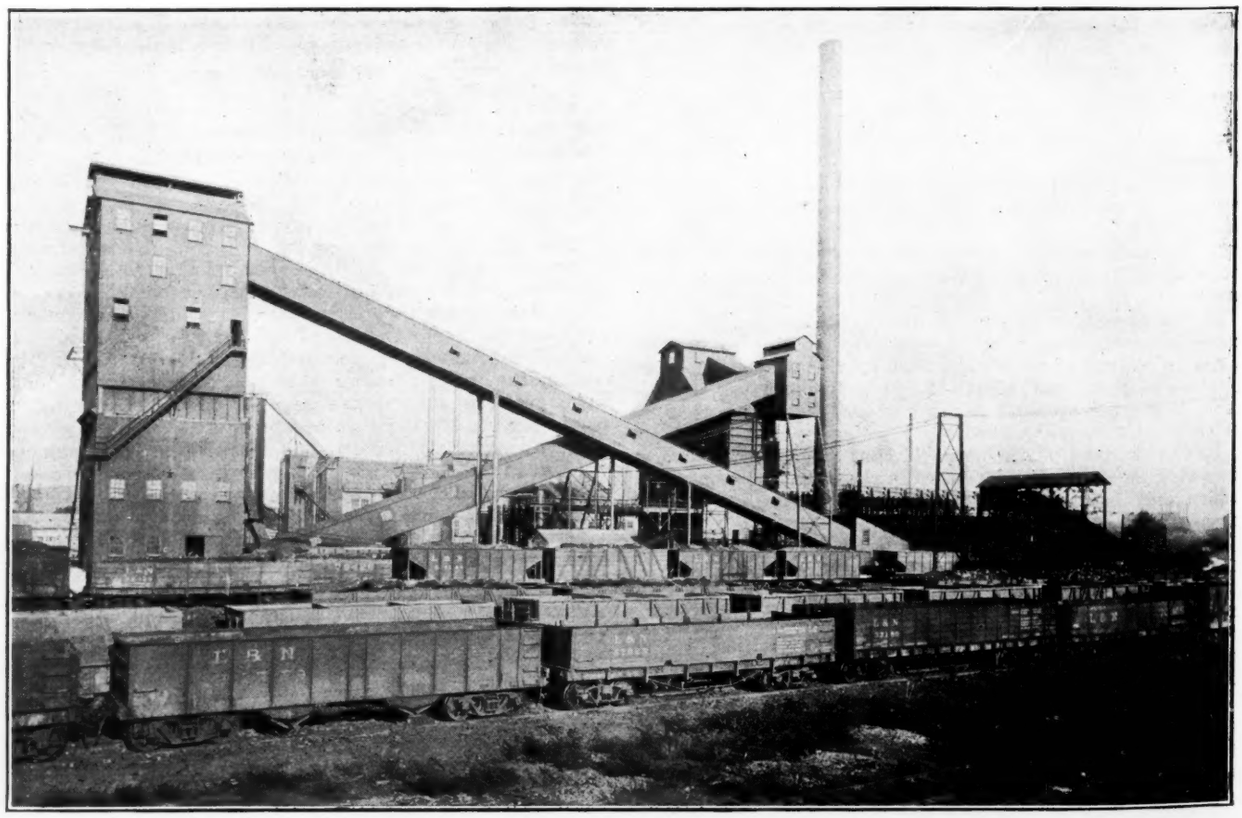
Year	Tons	Price Per Ton	Total Cost
1915	122,000,000	$1.13	$137,860,000
1916	136,000,000	1.32	179,520,000
1917	154,000,000	2.12	329,000,000
1918	166,000,000	2.95	489,700,000

Gulf States Steel Co. Byproduct Plant

In April, 1917, the Gulf States Steel Co. started to operate its byproduct plant of 37 Koppers coke ovens at Gadsden, Ala., shown in the accompanying illustration. This company owns or controls coal, iron ore and limestone properties in the vicinity of its steel mills, blast furnaces and byproduct plant. Thus ideal conditions exist for the production of low cost iron. Labor conditions also have been good, up to the time of general disturbance—a further contribution to the successful operation of the Gulf States steel plants.

The byproduct plant of the Gulf States Steel Co., shown in the illustration, is reported to have been particularly successful in operation. The most prominent features of the plant as shown are the coal handling and storage buildings. Coal is unloaded from railroad cars into a hopper from which it is conveyed to the top of the building shown at the left of the illustration. In this building the coal is crushed and pulverized, then moved by another inclined conveyor to the coal bin shown in the center of the illustration. The 37 byproduct coke ovens are directly to the right of the coal bin. The steel stack at the right of the bin furnishes draft to the coke ovens, to keep up a circulation of burning gases in the oven heating flues and hot products of combustion through the regenerators.

The byproduct plant is equipped with complete apparatus for producing ammonium sulphate, tar, benzol, etc., in addition to coke. The surplus gas from the coke ovens is used for reheating steel at the wire mills of the company. The plants for treating the byproducts —ammonia, tar, etc.—are shown in the background.



BYPRODUCT PLANT OF GULF STATES STEEL CO., GADSDEN, ALABAMA

Coal Mine Photography—I

By H. A. WILLIAMSON
Fairmont, W. Va.

SYNOPSIS—*The camera can often be used to supplement or expedite the work of the drafting room. It may also be employed to illustrate complaints or establish the reasonableness of claims. For photographing plans special plates and developers are advantageous, while for certain kinds of reproductions suitable color screens may well be employed.*

IT IS doubtful whether more than a very few mining companies make use of the photographer in connection with their work, and yet the possibilities of economies in time, material and convenience to officials and employees of all classes are large.

Probably the greatest economy and also the greatest convenience lies in the use of photographic reproductions of maps of mine workings. All agree that maps of workings on a scale of 100 or 200 ft. to the inch are large and inconvenient to handle, yet if the original tracings are made on a smaller scale the drafting-room work becomes laborious and slow and requires draftsmen of high skill in order to make the work intelligible; furthermore, the skilled draftsman commands a high salary and is hard to get at any price.

By producing the original maps on a standard scale of 100 ft. to the inch and then photographing this map down to 500 ft. to the inch a map is obtained which is entirely legible and convenient to carry in the pocket and to use in cramped quarters such as are often found in mines. They are also convenient to attach to correspondence and entail less expense in mailing. Quite crude lettering on the original map, if only it is sufficiently large to reduce, becomes reasonably good looking on reduction five times.

Camera Valuable in Drafting Room

In an office where a large amount of drafting is done (especially if parts of it be the building up of new maps from parts of others, frequently on various scales) there is no question of a camera being an economy. By reductions and enlargements parts of maps or other data can be brought to a standard scale with a rapidity and accuracy not to be obtained by even the most expensive pantograph or other mechanical method.

If an original map happens to be in various colors and the information conveyed by one or two colors only is wanted, screens can be used intensifying those tints desired and eliminating the undesirable. Old maps of great value can be photographed and from the plate enlargements or reductions can be made in any quantity, the valuable original being filed away as a matter of record.

Data from technical journals or other matter can be copied in convenient form and distributed to employees. One organization has obtained from a large public library various technical books containing information of value and copied with the camera such pages as are desired. These people have in this manner secured a library of essential information in compact form and of great value. Had it been necessary for them to purchase the books complete it would have been expensive and cumbersome, as in many cases there were large volumes of several thousand pages where they only desired possibly five or six pages of technical tables or similar data.

An item which has been of great value to one mining company has been the use of photographic enlargements of parts of the topographic sheets issued by the United States Geological Survey. These sheets contain information in regard to streams, roads, contours and other features. In establishing locations for new operations it was found that by photographing that part of the topographic sheet covering the specific area, and making an enlargement from the resulting negative, it was possible to bring the scale up to as much as 300 ft. to the inch (the original being one mile to the inch). This brought the contours to such size that it was possible to do a large part of the preliminary estimating before it became necessary to run accurate levels on the ground. As this allowed a large amount of office work to proceed ahead of the data brought in by the field parties a considerable period of time was saved.

Photographs Helped Settle a Claim

Some time ago a railroad company furnished to a certain mining company quite a number of badly damaged cars and also a number of cars containing large quantities of refuse material. The company receiving these empties complained on various occasions but could get no satisfaction; in fact were rather abruptly treated. This organization called in a photographer who made pictures of some 15 or 20 damaged and refuse-filled cars. These pictures were forwarded to the railroad company with a brief letter calling their attention to this evidence, which did not admit of refutation. The result was prompt and satisfactory, and this particular company has had no similar trouble since.

It is not to be supposed, however, that it is essential to have a photographic department in order to do this work. While this is desirable it is not absolutely necessary. The local photographer with a little coaching can do this work and usually welcomes it as an addition to his income.

As in everything, if success is to be obtained there are certain features which should be observed. While it is entirely practical to photograph almost anything, naturally better results are obtained if the possibility of photographing the final work is kept in mind at the time of producing a map.

To make a map excellent for photographing does not require any special effort, nor does it spoil the map for any other purpose. If one will bear in mind that a sharp clean line photographs better than a fuzzy one, the line need not be broad. It should, however, be dense; that is, a black line, good for photographing,

when held up against the light is sharply black and not gray in places where the ink has not been laid on from a well-filled pen.

As to lettering, it has been found after several years' trial that on a map to be reduced five times no letters on the original should be less than $\frac{1}{10}$ in. high, and they should be sharp and clean-cut. They do not have to be particularly well done, although, of course, the better the work the better the final map will look. A letter even as much as $\frac{1}{2}$-in. high poorly done does not look so bad when it is reduced five times or more. To repeat, with two simple rules: Make your line black, not gray. A $\frac{1}{10}$-in. letter will stand a five times reduction.

There is no reason why any ordinary draftsman, together with an intelligent photographer, cannot turn out a good photographic map.

For copying maps, either on tracing cloth, paper or mounted map paper, if no ink except black is used (or in some cases black, red and orange), the photographer should use a sensitive plate commonly termed a "commercial" or "contrast" plate; and in developing he should use a "contrast" developer, the object being to get a sharply black and transparent negative. It is of course necessary either to carry a stock of these "contrast" plates or to order them for each job. As they are cheaper than the usual portrait plates and also keep much better in storage than other grades, it is not much expense to carry a few of them in stock. (If kept dry and away from extreme heat these plates may be stored for 12 to 18 months without deterioration, and in some cases have been used with success after 24 months' storage.)

A Good Development Formula

A good developer for this work is made up as follows: Water, 15 oz.; sodium carbonate, $\frac{1}{2}$ oz.;[1] sodium sulphite, 1 oz.; potassium bromide, 15 gr. Of this take sufficient to cover the plate well and add three grains of dry pyrogallic acid for each ounce. (Pyrogallic acid should be added just when you are ready to use the solution.) The temperature should be 70 deg. F. Density comes slowly—the plate should be fully developed in three to five minutes. When developed immerse the plate in 16 oz. of water and 30 gr. of citric acid. After this fix thoroughly in an acid fixing bath.

If the map to be reproduced is in colors, a color sensitive, or as they are commercially known a "panchromatic" or "trichromatic" plate should be used with the developer recommended by the manufacturer of the plate. If the map is badly soiled or yellowed with age a screen of light yellow may be used to increase the contrast and cut out the dirt.

In field work (such as the railroad complaints mentioned above) pictures for advertising showing various grades of screened coal, character of equipment, working places or machinery within the mines, there is a wide range for the photographer. To do such work properly requires some simple equipment, which almost every photographer has, and quite a good deal of ingenuity. Topographic and triangulation work can be largely supplemented and aided by camera work. This, however, requires greater skill and special equipment, and would mean the employment of a photographer specially fitted to do the work; such expense would hardly be justified except in the case of large and important areas where a great deal of detail information was essential to carry out some special plan.

There is also the wide field of the motion picture camera, particularly valuable in advertising, and in safety and welfare work. This, however, is an industry within itself and should be dealt with apart from other camera work. The initial expense is high, as is also the operation, and such work is not ordinarily justified by the results except in special cases.

Naturally photographic work along the lines indicated can be abused and made expensive, but this is hardly likely to occur as such features are easily recognized and corrected. As a whole there is almost no limit to the work that can be carried on with the camera. There are economies that can be accomplished in no other manner, and as a convenience, once thoroughly tried out, it is seldom if ever abandoned.

(To be continued)

[1]Note: If desiccated sulphite and carbonate are used, use 100 grains carbonate instead of $\frac{1}{2}$ oz. and 220 grains sulphite instead of 1 oz. All the foregoing figures are based on 437½ grains to the ounce.

Briquets from Anthracite Slush

Anthracite producers are now giving earnest attention to the matter of increasing the fuel supply through salvage of coal fragments which have been slushed away from the breakers and lost. It has been found possible to utilize such waste anthracite by manufacturing it into briquets which make perfectly good and effective fuel. On a small scale this has been done with success and to the satisfaction of those who have used briquets.

Now the thought is to develop the briquet as a by-product of the anthracite industry. In 1917 the Lehigh Coal and Navigation Co. produced 30,001 tons of briquets. These consisted of coal fragments the size of pin heads and less, bound together with tar and compressed into solid lumps by high pressure. Briquets burn to excellent advantage in furnaces, ranges and open grate fires. As made they average about the size of nut coal.

Much of the anthracite refuse which is now swept down the streams and rivers of Pennsylvania is carbon, but until recently there was no way to conserve such lost coal to economic advantage. In the development of the anthracite industry and the progress made in all directions it has been found possible to salvage more and more coal which formerly was wasted.

Improved mining appliances and methods enable proportionally more of the anthracite in the ground to be taken out than in the old days. This is a gain in conservation of a valuable natural resource.

Under the old methods and before the breakers were highly perfected as they now are, a great deal of anthracite was, of necessity, discarded. Hence the huge culm banks of the past, which are now being washed over through washeries, yielding a large amount of coal in every way as good as fresh mined anthracite.

Salvage of the coal now lost in the slush washed away from the breakers will be, as it were, the last word in getting and making of commercial use all that is taken from the anthracite mines that will burn.

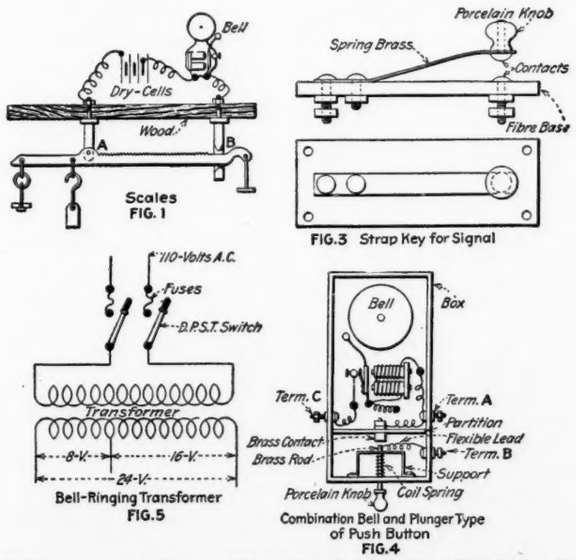
Electric Signals on a Modern Tipple

By FRANK HUSKINSON
Lafayette, Colo.

SYNOPSIS—*A system of signals is here described that enables intercommunication between various localities on the tipple. The scale signal is semi-automatic in that when a car has received a certain loading a warning bell is sounded.*

ON A tipple that has two dumps and where coal comes from several mines, a reliable system of signals that can be heard above the noise is necessary to enable the dumpers to know when to start or stop the dumping of coal. Nowadays, when the railroads require that all cars must be loaded to within a very small per cent. either under or over their rated capacity, it is necessary where there are several scales that these be arranged in such a manner as to give a warning signal when the car is about loaded. It is also necesary that the weighmaster be enabled, by a system of signals, to let the dumpers on top of the tipple know when to stop and when to start to dump coal, while he furthermore must be able to signal to the box-car loader operator and the car droppers, and they to him.

The tipple at the mines at Delagua, Colo., have two dumps, each one independent of the other. The average amount of coal handled over this tipple exceeds 2200 tons per day. There is a weigh-house for each dump on each side of the tipple to weigh the coal as it comes out of the mines. Most of the coal is loaded into box-cars. There are four railroad tracks underneath the tipple, each with its separate scale. The slack is



FIGS. 1, 3, 4 AND 5. SHOWING VARIOUS DETAILS OF SIGNAL SYSTEM

screened out and the balance of the coal is loaded into coal cars or box-cars.

The scales for weighing the railroad cars are located together in a room halfway from the bottom of the tipple to the top. One man attends to all of the weighing and billing out of all the railroad cars, and it is seldom that a car is overloaded or underloaded, due mainly to the system of electric signals.

In the weighmaster's room each scale is arranged with a signal system, as shown in Fig. 1. The scale beam is pivoted at *A*, and connection is also made here. The stop at *B* is normally open on the upper side until

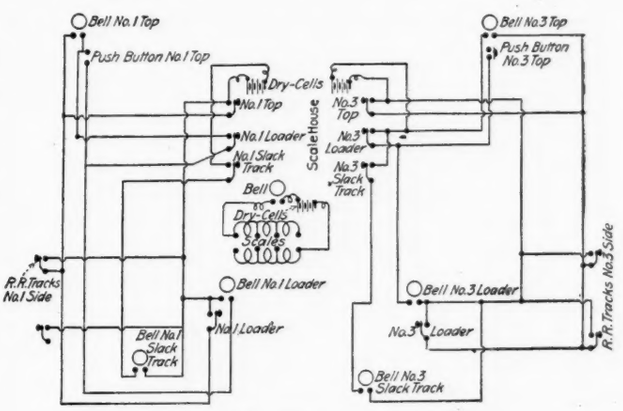


FIG. 2. COMPLETE WIRING DIAGRAM

the scale beam balances. The bottom stop on *B* is insulated from the beam by a piece of fiber. When the scale beam balances it makes contact with *B*, to which another connection has been made, This closes the circuit, causing the electric bell to ring as long as the scale beam is touching *B*. It thereby attracts the weighmaster's attention to the scale. As soon as a car is run onto the scales the weighmaster weighs it and sets the scale so that it will balance at a few hundred pounds less than the capacity of the car. He pays further attention to the scale only when the bell rings.

In order to let the box-car loader operators know when to start or when to stop loading there is a strap key at each scale that rings a bell at the box-car loader. A strap key is also installed at each scale so that the weighmaster can ring the bell at the top of the tipple to let the dumpers know when to stop or when to start dumping coal. Furthermore, the bell box at the top of the tipple is fitted with a special push button, so as to ring the bell at the box-car loader, and the box-car loader is provided with a strap key for ringing the bell on top of the tipple. Two strap keys are located at each railroad track. These keys are placed so that a man can signal with one of them from the ground or from the top of a box-car or coal car, to start or stop the dumping.

In Fig. 2 is shown the complete wiring diagram for the entire system of bells and strap keys. In Fig. 3 is shown the construction of one of the strap keys. These are easily and cheaply made and are reliable and durable, with nothing to get out of order. In Fig. 4 is shown the construction of a combination bell box and special plunger type of switch, all completely inclosed in a weatherproof box, so that the weather as well as those persons that are always experimenting and putting such things out of order can not get to it. This

switch is reliable and durable, and will not get out of order.

I made up and installed the complete system as shown in the diagrams, over a year ago, and it has not given any trouble other than the dry cells having to be replaced periodically. At the present time I am figuring on taking out the dry cells and putting in a good bell-ringing transformer. A diagram of the transformer is shown in Fig. 5. This can be used instead of the dry cells. The change will mean that the bells, if made for direct current, will have to be readjusted and will require more voltage from the bell-ringing transformer than they do on the dry cells. As shown in Fig. 2 the scheme of wiring is interesting since it is designed to give the most satisfactory service with a minimum amount of wire.

Coal Washery Collapses

BY CORRESPONDENT

The photograph shown below is of the wrecked washery at the Parrish colliery of the Lehigh & Wilkes-Barre Coal Co., Plymouth, Penn. The washery was working as usual during the morning, but as the afternoon operations were resumed it was noticed that the wooden foundations were cracking and, therefore, the employees were ordered out. The building fell to the ground at 1 o'clock, Apr. 29, 1918.

The washery at this operation was built in 1910 and enlarged in 1912. The trouble began in the center of the building, directly under the pockets, which rested on upright pieces 12 x 12 in. in size. As soon as the supports under the pockets gave way the building collapsed toward the center from the four sides.

The building site is located on low ground, and the occasional floods and the wash water resulting from the operations rotted the foundations, thus weakening the supporting timbers, the decay of which was of course accelerated by the alternating wet and dry condition. Owing to the warning, no one was hurt.

Some Observations on Ice, Water and Steam

BY W. D. OWENS
West Pittston, Penn.

Ice is found to be much lighter than water. In other words, it requires 109 cu.ft. of ice at a temperature of 32 deg. F. to produce 100 cu.ft. of water at the same temperature. This is the reason why ice floats, having about one-eleventh of its bulk exposed above the level of the water. Ice, also, to a certain extent, at a temperature of 32 deg. F., has the power of absorbing heat without any apparent rise in its temperature even though a change of state takes place. Thus, if you take a pound of ice at 32 deg. F., and another pound of water at a temperature of 174 deg. F., and insert the ice into the water at the above temperature, the heat of the water will convert the ice into liquid. There will then be 2 lb. of water, but its temperature will be only 32 deg. F. Thus, 142 units of heat were absorbed by the 1 lb. of ice, the only effect being to convert it into water. Hence 142 B.t.u. is called the latent heat of ice.

In converting the pound of ice into water it contracted in bulk about 9 per cent.; but if heat is applied further to the 2 lb. of water at 32 deg. F., the volume will still continue to contract or diminish in bulk until the temperature reaches 39.2 deg. F. At this point water weighs more per cubic foot than at any other temperature. In other words, if water is made either higher or lower in temperature than 39.2 deg. it will expand.

Water when heated under atmospheric pressure from 39.2 to 212 deg. gradually but continuously expands. At the latter temperature, however, it ceases to increase in volume; but upon continued absorption of heat is converted into steam. It also ceases to become warmer, or higher, in temperature as long as the pressure of the atmosphere is constant.

The amount of expansion between 39.2 and 212 deg. is but 4.3 per cent., and its specific gravity undergoes a corresponding change. Pure rain water weighs 62.424 lb. per cubic foot at 39.2 deg. F., and its specific gravity

WRECKED WASHERY AT THE PARRISH COLLIERY OF THE LEHIGH & WILKES-BARRE COAL CO.

WATER-PURIFYING PLANT AT COAL MINE IN CLEARFIELD COUNTY, PENNSYLVANIA

at this temperature is taken as a standard, being here unity or one. All comparisons between the weight of air and water should be taken at a temperature of 39.2 deg. F. or 4 deg. C. The weights of the two fluids at this temperature are in the ratio of 1 to 786, or, in other words, water is 786 times denser than air at this temperature. If air and water are heated above this temperature the expansions are not proportional. Water expands on an average between 39.2 and 212 deg. F., about 1 in 4000, but the expansion of air is constant—1 in 460. If, however, the temperature of both air and water be reduced below 39.2 deg. the air will contract 1 in 460 and becomes heavier per unit volume, while water expands and becomes lighter.

If 1 cu.ft. of water is raised in temperature to 212 deg. F., or boiling point in the atmosphere, and kept boiling continuously, it will in a certain period be all converted into steam the volume of which will be equal to 1696 cu.ft. This steam will however retain a temperature of 212 deg. F. or 100 deg. C.

Again, if this body of steam, 1696 cu. ft., is now allowed to enter a volume of water at 32 deg. F. and weighing 5.36 times as much as the steam, the steam will all condense into water; but the temperature of the whole body will be found to be 212 deg. F. In other words, 1 lb. of steam at 212 deg. F. will raise 5.36 lb. of water from 32 deg. F. to a temperature of 212 deg. F., when the whole resulting 6.36 lb. will show this same temperature. Therefore $(212 - 32) \times 5.36 = 966$ B.t.u., which is called the latent heat of steam. This is equivalent to 536 units of the centigrade thermometer.

The molecular weight of water vapor is 8.96 when hydrogen is taken as 1; oxygen, 15.96; common air, 14.45, and nitrogen 14.1; hence if a cubic foot of air at 39.2 deg. F. weighs 0.0794 lb., a cubic foot of water vapor at the same temperature and pressure will weigh only 0.0493 lb.; and, according to the rules of expansion, will weigh at a temperature of 212 deg. as follows: $\frac{460 + 39.2}{460 + 212} \times 0.0493 = 0.0366$ lb. Or dividing 62.424 (the weight of 1 cu.ft. of water at 39.2 deg.) by 1696 (its total expansion into steam), will give practically the same result; thus, $\frac{62.424}{1696} = 0.0368$ lb.

Mine Water-Purifying System

The illustration above is of a water-purifying plant at one of the large mines in Clearfield County, Pennsylvania. At some periods of the year this colliery can procure clean water from the Buffalo, Rochester & Pittsburgh R.R. for use in its boilers, but for the most part it is forced to use mine water. This water is full of impurities, and to prevent it from ruining the boilers it is treated with soda and lime, the quantity used depending on the analysis of the water.

The water tanks, of which there are three, are 15 ft. in diameter and 15 ft. deep and contain 19,880 gal. of water each. Twelve tankfuls of water are used by the boiler plant in 24 hours. After the lime and soda have settled, the water is drained off from the bottom of each tank and filtered through charcoal and sand to the supply tank. This equipment was furnished by Scaife & Son.

Referring to the illustration, the house farthest up the hill is the supply house. The one just below it is the mixing house. Immediately to the rear are the three treatment tanks. The tank shown on the extreme right is one of the two supply tanks, the water from which is fed direct to the boilers.

The ratio of the volatile carbon to available hydrogen is only one of probably several factors which may indicate the burning qualities of volatile combustible. Among the other factors the oxygen content in "moisture and ash free" coal suggests itself as the most important one.—*Bureau of Mines Bulletin No. 135.*

War as a Supreme Test of Efficiency*

By EDWARD N. HURLEY
Chairman, United States Shipping Board

IN PAST wars victory was thought largely a matter of purely military strategy. Under our highly organized system of today, the whole weight of the nation must back up with its full resources military and naval action. Otherwise there can be no effective action. This means that everything of basic importance needed to carry on the war must be operated as a unit. Coal is a fundamental. Transportation for the carrying of coal and all other commodities is another fundamental. Our Government is fast going ahead with its process of coördinating railroad systems and inland waterways, lake, coastwise and ocean transportation. Railway equipment is being provided. Fleets of ships and vessels have already been speeded from our shipyards, and many more will follow.

Whatever the length of the war, we are preparing in good measure for present and future. We are doing it in a large way worthy of our great country. Not only for the war, but for the times after the war, when we shall be called upon to do the immense work of rehabilitating devastated Europe. Other countries needed our coal before the war—nearly 21,000,000 tons of it annually. They have needed more of it since the war began. They will need it after the war. And we will not only have the vessels and other vehicles to carry on our inland and coast waters and on our railroads the millions of tons of coal used yearly in this country, but we shall have a great merchant marine of our own to carry coal and all other American products to other countries.

Up to Operators to Produce Coal

The distribution of coal is only one part of the problem. The coal requirements for the United States for the coming year are nearly three quarters of a billion tons, and if this nation is to run on a war basis during the next twelve months, the coal mines must produce at least seven hundred million tons of coal. That is an enormous tonnage that the nation calls on you to furnish. We understand that in the past your production has been limited by insufficient transportation. The fact is now well understood, but the railroads of the United States have been brought under the direct control of the Government. We are told that one billion dollars will be expended this year in improving and expanding our railroad transportation facilities. With new locomotives and cars and with new tracks, bigger yards and better terminals and with centralized control, sooner or later the mines will be furnished all the transportation needed to haul their output to the points of consumption. It will then be squarely up to you to produce the coal. In the meantime you will have suffered a progressive loss in the numbers of your employees and unless you have made preparation to get the utmost efficiency out of your mines and your organizations, we will fall far below the coal production that we will need.

It seems to me that one of the most important things your association can do is to begin active preparations now to increase your efficiency so as to maintain the production of coal at the highest possible level. You have taken the first step in this direction by working out a uniform system of cost accounting and by organizing a cost accounting department to assist mine operators to put their business on a sound basis. In every trade association the strong must help the weak and in most cases the weak are those who know the least about their own business. Accordingly, the first move to strengthen your industry is to teach those weak producers the facts about their own conditions. Coal should be mined at a profit, but no man can know whether he is really making a profit or not unless he knows his costs.

Thoroughgoing Cost Accounting Means Efficiency

Profits are not all, however. No man can know whether his organization is really efficient or not unless he knows his costs and unless he has some standard of costs, either the average for his field or the figures of the lowest producer which he can use to compare with his own. It is vital to us all to develop the highest industrial efficiency of which we are capable today. In one sense, this whole war is a test of industrial efficiency. Thoroughgoing cost accounting is the very basis of efficiency in your business, as in every other business. Accordingly, it is especially gratifying for me to know that you have already begun this first great educational work which you must carry on among the coal producers of the United States in order to increase your efficiency.

In the next place, you should examine critically your own management. In my judgment, 50 per cent. of the inefficiencies of coal production today are due to poor management. At this meeting your association should recommend that in each district a committee on efficiency be appointed and that they put forth every effort to improve the management of the mines in that district. Many of your properties are well equipped and well managed and might serve as models for all the world. They set a splendid standard for the efficiency committee to measure up to, yet you know that there are hundreds of mines that are not well equipped; that are indifferently operated; that are loading poor coal; in short, that are poorly managed. They constitute a fertile field for your efficiency committee to cultivate. This is one way for you to show the Government and the people that your association is really worth while. As long as you have inefficient management in any considerable part of the coal-mining industry, this organization is necessary for the success of the coal-mining business.

I have always thought that the mining of coal could be improved by the use of more supervision. The general manager of a certain property once told me that in his mine he had a foreman to approximately every 200 men. The president of his company, after looking into the matter, asked him to increase the

*Abstract of speech delivered before the National Coal Association at the Bellevue Stratford Hotel, Philadelphia, May 28, 1918.

number of foremen and assistant foremen to one to every 40 or 50 men. This was done, and he found that the greater attention to detail, the better care of the property, the decrease in accidents and the general improvement of his organization, resulted in a very definite increase in the production. We found the same fault in many of our shipyards when we had their management looked into. We found many yards had no competent foremen, no layout men, no supervision at all that modern industrial practice demands. We put a sufficient number of good superintendents and foremen into those yards and obtained surprising increases in the efficiency of production. Isn't it worth your while to make this kind of study of your own organizations? When we found that we did not have sufficient foremen or layout men and that many of the men did not know the best methods of work, we established schools to teach the fundamentals of shipbuilding to the men and the superintendents.

When Mr. Schwab made his first trip to Hog Island he wanted to get in contact with the workmen, the foremen, and the superintendents, instead of the president and vice presidents, and he said: "Hurley, if we are going to build these ships, I must meet the workmen, foremen and the superintendents; they are the men that are going to finish this job for us." Your superintendents and foremen are running your mines while you are here in Philadelphia. You know that the superintendent out at the mine is on the job today and that everything will go all right as long as he is there. In addition to paying good wages to your workmen, pay your foremen and superintendents good salaries and encourage them with a bonus on your increased output.

If each industry in this country would have its superintendents and foremen get together, either through some auxiliary to their trade associations or through some school, to discuss ways and means to improve their methods of production and management, they would materially benefit their industry.

Labor Playing a Great Part

Labor is playing a greater part in this war than in any other conflict which the world has known, and let me say here that in the United States labor as a whole is measuring up to its responsibility splendidly. The leaders of organized labor in Washington are men of the highest character, patriotism and honesty. All of us who are acquainted with Mr. Gompers' work know that he has endeared himself to the people of America and all of the allied nations by the position which he has taken in this war. He has about him other able men who are equally loyal and patriotic.

On the whole, however, labor as well as capital is not producing that degree of efficiency that it should produce in these trying times. If faulty management is responsible for 50 per cent. of the inefficiencies in the production of coal today, inefficiency on the part of labor is responsible for the other 50 per cent.

The reports to the Government show that from 10 to 20 per cent. of the men in the mines are not working as they should. In mines that are given sufficient car supply there are some employees who are not working as steadily as they should. Some of these men fail to work their full eight hours when they do enter the mines. Others work only three or four days a week when they might work six. Under these conditions, it is not a question at present of increasing the number of hours the mine operates per day, but it is a question of the men working fuller time each day and working more days in the week.

Men Were Willing to Work Overtime

You may say that this is primarily a matter for labor itself to deal with. In part that is true, but have you yourselves done all you can to remedy this condition? The president of one big western Pennsylvania coal-mining company recently found that with a full run of cars, a certain number of the cars were standing over at his mines every night and were not being loaded. He took the matter up with his men in a meeting and explained to them something of the necessity to the nation at present of having increased coal production to carry on the war, and brought home to them as best he could their responsibility to mine the coal. After the meeting was over, some of the English-speaking miners came to him and said that if the country needed the coal they were willing to stay overtime and get other men to help load the cars that were left over each evening. That incident serves as an illustration of the spirit that can be roused in your men if they are properly approached. They are just as patriotic as you or I. Their sons and brothers are going into the trenches.

They will do their part as earnestly as any of us if they understand clearly what their duty is, but it is first up to you, the presidents and owners of coal properties, to do your part by going to the mines personally, obtain first-hand information and explain to your men the great need for increased production.

With full running time, the mine wage scales are remunerative and the men can make good earnings. Wages are based on the effort of the individual miner. Practically all of the coal in the United States is paid for on the piece-work basis at some rate per ton. Under these conditions, if the miner wishes to increase his earnings, he can do so by working more energetically and nearer full time. In getting increased efficiency from labor, therefore, there is no question of a fair day's pay for a fair day's work. The man can get his fair day's pay if he is willing to work.

I wish to express my admiration for the United Mine Workers of America as a great labor organization that recognizes the piece-work basis.

The United States Shipping Board Emergency Fleet Corporation has established a rule that any piece-work rate set by any shipbuilder must stay in force during the period of the war. The controversies between employers and employees over the question of piecework has been most serious, and the employers in many cases have been chiefly to blame. Any manufacturer, whether he be a producer of coal or any other commodity, who sets a piece-work rate, finds he has made a mistake, and then reduces that rate, is doing a great injustice to the workman. A piece-work rate set by a manager, superintendent or foreman is a contract that should be kept in force for at least one year. Furthermore, if this piece-work rate is on a particular machine, and

the man or the operator should leave or be dismissed, the man who succeeds him should receive the same rate. A law passed by the Government making it compulsory for a piece-work rate to remain in force for a given time from the date it is put into effect would be helpful to labor and industry.

It cannot be doubted that in many industries there will be a decided shortage of labor after the war, not only in this country, but in most of the countries of the world. That country will best succeed which protects its workmen by improving their living conditions, by providing for insurance against accidents and protection for their families, and guaranteeing a fair return from their labor—all under conditions that will be helpful to make the worker a better citizen. The country taking those measures will be the country that will develop and produce the products most economically, and will be performing a world service by producing goods at a price that will be fair to other nations. Unless we have efficient management and efficient employees, our country will be at a great disadvantage compared to countries which establish these improved conditions.

It is true that labor itself must do its full share in obtaining increased efficiency from mine labor, and if the operators have committees in each district to increase the efficiency of mine operation the United Mine Workers should appoint committees to take up this matter of fuller working time and better effort on the part of mine labor. In some effective manner mine operators and mine workmen should coöperate in democratic fashion in the common cause of winning this supreme struggle for democracy by obtaining increased production of coal.

Shipbuilding Industry Solved Its Problems

Some of the problems that you are meeting in this industry we have had to meet in the building of ships, and a brief outline of our efforts to overcome them may afford you some suggestions that will be of value in solving your own problems.

In the sphere of shipbuilding we built 91 new wood and steel yards since last July. Most of the organizations that built these yards and many of those working on our great new merchant marine are men who had never before built ships. A vast force of men were put to work on yards and ships of all kinds. New foremen and new superintendents were engaged. Many obstacles, such as develop in a new industry, turned up, but we constantly tried to improve our knowledge about the building of ships. One particularly serious problem faced us. We found we did not have sufficient foremen or layout men. We started a number of schools to educate the men and teach the fundamentals of shipbuilding. Less than a year ago there were not 45,000 men employed in American shipyards—today we have 300,000 skilled mechanics and laborers in our shipyards, and 250,000 additional men are employed in making boilers, engines, winches, etc.

We have a Department of Education and Training, whose task it is to train workmen, foremen and superintendents. The training of the various kinds of shipbuilders in the yards is accomplished by putting the men to work on production jobs, under the supervision of a yard instructor. This yard instructor has full charge of gangs while they are learning. The jobs they do are selected for their educational sequence, but are all of them production jobs. The efficiency of a green gang under training will average about 80 per cent. that of a finished workman. Yard instructors are skilled mechanics to whom has been given a knowledge of teaching method. This knowledge is gained in a training center, which is designed to teach the skilled mechanics how to instruct. The mechanic is given an idea of instructional management, and how to get the instructions across effectively. The difference between a yard instructor so trained and a production foreman is that the former knows how to go about the job of teaching, whereas the latter does not.

The first training center was established at Newport News. To it were sent skilled mechanics, selected from the yards. They were given a six weeks' course of training, eight hours a day. During the last part of this course they were obliged to spend 40 hours in the actual handling of gangs of green men. Yard instructors are drawn from a variety of trades, such as riveters, ship fitters, ship carpenters, caulkers, etc. While each one teaches a different line, the instructor training which they get is essentially the same. Twenty-two plants have sent men for training as yard instructors. Of these 216 have completed their training and 74 are now in training.

Could Make Improvement in Other Industries

In addition to the training of green men, there exists the problem of taking men who are already skilled in allied trades, but have never worked in shipyards, and making them into shipbuilders. This is called a trade conversion course and consists essentially of determining what supplementary work a skilled mechanic from the allied trades must have in order to give him the necessary knowledge to do shipbuilding work. Careful studies of this conversion process and the instruction necessary have been made and special trade conversion instructors are employed in a number of plants to meet this situation.

If we could do this in the shipbuilding industry, if we could develop in a year the building of wooden ships which has been a long-lost art, if our workmen in many yards have increased in efficiency more than 25 per cent. through this method in the past few months, it can be done in other industries. We did it by improving the management. Where we have efficient management we have efficient workers. You can't expect to have efficient workmen in an inefficiently managed shipyard nor can you expect good results.

It we have thus been able to start anew the building of ships and in a year's time have organized a great new industry employing almost as many men as yours, if we are throwing away the old standards and setting up new ones, if we are breaking records every day, if we are devising new methods to improve our management and increase the effectiveness in the shipyards, I trust that you men will rouse yourselves to new efforts, will take a fresh view of your industry, and will obtain a sufficient production of coal, in spite of all the difficulties that may beset you, and will give the Government your thoroughgoing support in carrying on the war. These are the results that the nation will inevitably expect from you and I am sure you will not disappoint the American people.

We are building ships not alone for the war, but for the future of world trade. Remember that once their part in the winning of the war is ended, a large number of them will be engaged in bringing back to home and industry the victorious soldiers, and in transporting to Europe the materials necessary for reconstruction of normal life freed from the menace of avaricious autocracy. These vessels will serve the commerce of other nations equally with our own.

The building of ships, the mining and distribution of coal, the production and conservation of food products and other important war necessities are all vital to the nation's needs during these trying times. No great task can be undertaken, if quick action is to be obtained, without the making of some mistakes. We may make mistakes, but we are moving forward and getting results. We cannot go far wrong with the American people united and working for victory. If each of you will do your part, putting your country above everything else, we will win.

Anthracite Distribution Program for Current Coal Year

The Anthracite Committee of the United States Fuel Administration—composed of Joseph B. Dickson, S. D. Warriner and W. J. Richards—has gone over the whole problem of fuel supply and distribution in conference with Dr. Garfield. Those in charge of the bituminous distribution, who have an equally difficult problem, have also been consulted. Both must be worked out together to best uphold the public interest. To meet the war needs compels use of considerable anthracite in place of bituminous. This has been arranged through undertakings to substitute bituminous wherever it can be used.

Upon such basis of coöperation, which entails not only readjustments in the country's fuel supply as between sections and uses, but a new balance as between anthracite and bituminous, domestic sizes of anthracite will be distributed during the coal year, which runs until Apr. 1 next. This distribution and arrangement has the approval of Dr. Garfield, United States Fuel Administrator. The following allotments will be made under it:

1. It is closely figured that a total of 54,345,783 tons of anthracite of domestic sizes will be available for distribution to consumers during the period. Such amount will be an increase of 2,668,323 tons, or more than 5 per cent., over the actual distribution for the coal year 1916-1917.

2. Distribution to New England and Atlantic states will be materially increased to meet the greater requirements of their expanded population. It is to be noted that the greater needs in these states for domestic fuel are not in full proportion to the larger population, for the reason that the average number of people per house, particularly among industrial workers, has increased so that the additional houses to be warmed are not as many as might be expected.

3. Government requisitions for anthracite to be suplied the army and navy, and to war industries and utilities which require it, will be fully met.

4. To make possible such necessary increased distribution upon Government orders and through those sections of the country where the people are dependent upon anthracite for heating and cooking, there is no alternative but to curtail shipments to other states and to bar anthracite entirely from many more where it has been used but in which bituminous and other fuels can be procured and substituted.

Comparing with the coal year 1916-17 the foregoing work out as follows:

	Tons
Increased production	2,668,323
Curtailment in distribution	2,202,288
Gain from barred sections	765,931
Total gained	5,636,542
Less army and navy	600,000
New balance available	5,036,542

Such available freed balance is allotted to increase the distribution of domestic anthracite among the New England and Atlantic states. It enables an increase of 1,497,621 tons, or 17 per cent., in the total amount to go to New England, and of 3,538,921 tons, or 13 per cent., in the amount for the Atlantic states.

Fuel Administrators of the six New England states figured the probable demand of 10,699,400 tons for domestic requirements. The allotment made by the Anthracite Committee is 10,331,000 tons of domestic sizes for all purposes.

Fuel Administrators of the Atlantic states—New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia and the District of Columbia—asked for a total of 33,413,621 tons for domestic requirements. To the Atlantic states the allotments by the Committee total 31,417,154 tons of domestic sizes for all purposes, an increase of 12.69 per cent. over last year.

Increased Allotment for New England

Increased allotments to New England and the Atlantic states are made with regard to their necessities—the larger population which the war has concentrated in such sections, their essential dependence upon anthracite, and the virtual impossibility of getting bituminous for their needs. Shipments to the full amounts of the allotments are dependent upon the expected output of domestic sizes being reached.

It must be understood that these allotments to New England and the Atlantic states represent absolutely the maximum amounts which can be given without grave injustice to people elsewhere in the United States and Canada who require anthracite in substantial amounts.

The Anthracite Committee states further that should it be possible to gain any anthracite out of the nearly 2,500,000 tons used by the railroads for fuel, or to expand the total production above the 54,345,783 tons of domestic coal estimated as the output for the year, such gained coal will be distributed to increase the allotments as now fixed for the central and northwest states, which, as it stands, are called upon to make large sacrifice from their accustomed prewar supply of anthracite.

Compared with the actual distribution for the coal year 1916-17, both by state and groups of states, the allotment of domestic anthracite for all purposes for the current coal year as made and now publicly announced by the Anthracite Committee is as follows:

ALLOTMENT OF DOMESTIC ANTHRACITE FOR ALL PURPOSES FOR THE CURRENT COAL YEAR COMPARED WITH COAL YEAR 1916–1917

	1916–1917 Distribution	Allotment, 1918–1919	Increase, Per Cent.	Decrease, Per Cent.
New England:				
Maine	556,683	660,000	18.56	.....
New Hampshire	314,945	375,000	19.07	.....
Vermont	316,850	330,000	4.15	.....
Massachusetts	5,027,993	5,689,000	13.15	.....
Rhode Island	664,008	800,300	20.53	.....
Connecticut	1,952,900	2,476,700	26.82	.....
Total New England	8,833,379	10,331,000	16.95	.....
Atlantic States:				
New York	14,169,809	15,855,300	11.89	.....
New Jersey	4,961,622	5,460,784	10.04	.....
Pennsylvania	6,815,650	8,059,700	18.25	.....
Delaware	223,503	245,853	10.00	.....
Maryland	933,889	1,027,317	10.00	.....
District of Columbia	517,760	665,800	28.59	.....
Virginia	256,000	102,400	.....	60.00
Total Atlantic States	27,878,233	31,417,154	12.69	.....
Central States:				
Ohio	585,626	246,250	.....	57.95
Indiana	710,274	284,110	.....	60.00
Illinois	2,215,122	1,750,585	.....	20.97
Michigan	1,589,002	1,201,000	.....	24.42
Total Central States	5,100,024	3,481,945	.....	31.73
Northwest:				
Minnesota	1,071,532	990,000	.....	7.61
Wisconsin	1,181,926	1,024,000	.....	13.36
North Dakota	249,314	200,000	.....	19.78
South Dakota	207,416	166,000	.....	19.97
Total Northwest	2,710,188	2,380,000	.....	12.18
Trans-Mississippi:				
Missouri	129,289	.....	.....	100.00
Kansas	15,907	.....	.....	100.00
Nebraska	130,273	.....	.....	100.00
Iowa	352,496	.....	.....	100.00
Total Trans-Mississippi	627,965	.....	.....	100.00
RECAPITULATION				
New England	9,833,379	10,331,000	16.95	.....
Atlantic States	27,878,233	31,417,154	12.69	.....
Central States	5,100,024	3,481,945	.....	31.73
Northwest	2,710,188	2,380,000	.....	12.18
Trans-Mississippi	627,965	.....	.....	100.00
Twenty-four states	137,966	.....	.....	100.00
Railroad supply	2,481,754	2,481,754	.....	.....
Canada	3,856,021	3,602,000	.....	6.59
Miscellaneous exports	51,930	51,930	.....	.....
Army and navy camps and cantonments	.....	600,000	.....	.....
	51,677,460	54,345,783	5.16	.....

When Mine Accidents Occur

Speaking before the American Institute of Mining Engineers at its recent meeting E. E. Bach, the sociological director of the Ellsworth Collieries Co., declared that at least 75 per cent. of all accidents can be prevented and that the Ellsworth concern reduced its accident list 40 per cent. in the past year.

It is in the months of July and August that the greatest number of accidents occur. October and February have the fewest of the unfortunate occurrences. The investigation of the Ellsworth Collieries Co. as to the relative hazards of the days of the week has covered a period of 7 years and shows that the greatest number of accidents occur on Tuesday and the second largest list occurs on Monday. Apparently these are the results of celebrations held on previous Saturday nights and Sundays. There are 52 distinct holidays scattered through the year, aside from the regulation American holidays, and they are followed by a lot of accidents.

The greatest number of accidents occur in the morning between 10 and 11 o'clock. In the afternoon they occur between 2 and 3 o'clock. T. T. Read, of the New Jersey Zinc Co., said that August was the unfortunate month for accidents at the zinc company's mines and that 10 o'clock in the morning and 2 in the afternoon, as Mr. Bach has found, had an unfortunate preëminence in accident rates.

Minecdotes

The Mine Foreman Solves a Hoisting Problem

An irascible mine foreman of Welsh descent, after completing his day's work, went to the foot of the hoisting shaft to be hoisted to the surface. When he arrived at the shaft foot ten men were on the cage and the bottom man was about to give the bell. "Hold on there," said the foreman, "I am going up along."

"There are already ten men on," responded the cager.

"Never mind," said the foreman, "don't you think I know what I am doing? The last man who got on that cage get off."

No one moved.

"I tell you, the last man get off."

Still no one made a move to get off.

"All right, then," he said. "I'll fix you. Come off of there, every man of you."

Of course, the men as ordered filed off the cage. The foreman, after getting on, said, "Now, then, nine of you get back on."

In Which the Paymaster Settles a Complaint

Jim was a hard-working miner and usually lifted a fat envelope on pay day. But Jim had a great fondness for the dollar, and it seemed as if he never got quite enough in his envelope to satisfy his craving. So he fell into the habit of complaining whenever he received his statement.

He would walk to the pay window, look at his statement, and then blurt out with an indignant snort, "Say, mister, I am short about five."

The paymaster would talk to him, explain every detail of his account, and when all else failed the mine boss and superintendent would be called in to help smooth matters. In the end Jim left the pay window breathing dire maledictions against corporations large and small and all paymasters in general.

The paymaster stood this for several months. Finally the thing got on his nerves, and he thought of a little scheme to put an end to it. His idea was to put five dollars more in Jim's envelope than was really due him, and await events.

Pay day arrived, so did Jim. He walked up to the pay window, went through the same maneuvers, finishing as usual with, "Say, mister, I'm short again."

The paymaster took the envelope back and carefully counted the money. Then, producing the accounts, he proved that the envelope contained five dollars too much and said, "I'm sorry, but I must take this five out of your envelope."

Jim looked quite crestfallen as he handed back the extra five; but the scheme worked like magic, for he never after complained of being short on pay day.

High temperatures such as exist in boiler furnaces and absence of oxygen promote the decomposition of all hydrocarbons, including methane, the lightest of the paraffin series, one of the products of decomposition being soot.—*Bureau of Mines Bulletin No. 135.*

Gravity Track Systems at Anthracite Coal Breakers*

By F. N. RUPPRECHT
Wilkes-Barre, Penn.

SYNOPSIS—*Five typical arrangements of tracks at coal breakers and washeries are here presented. Local conditions dictate what general plan of trackage must be adopted. Sometimes local topography dictates a design inconvenient from the operating standpoint.*

IT HAS been estimated that in the United States nearly half a million freight cars are continuously employed in hauling coal traffic. All railroads derive some revenue from this trade, but with certain roads it is the main source of income. Such roads as a rule originate the coal traffic and are vitally interested in methods that prove most economical in handling cars. This applies with particular emphasis to the loading of cars at the mines and their subsequent making up into trains. This article deals particularly with the conditions and methods employed in the anthracite region of northeastern Pennsylvania.

Coal mining and transportation have a mutual attraction for each other. Wherever convenient, collieries are located on the main line of some railroad; otherwise, a branch is built to the mine. The former practice is preferable, since in a thickly settled rolling country the construction of branch lines is difficult, and high real-estate values render it costly. Frequently the haulage problem can be most readily solved by means of narrow-gage tracks either on the surface or underground, over which the unprepared coal may be taken to a convenient breaker. Nevertheless, an extended network of railroads traverses this coal region, upon which traffic moves in all directions.

Maximum Production Not Maintained

The annual production of somewhat over 80 million tons of anthracite in Pennsylvania is divided among many collieries. The daily capacity of these plants ranges from 500 to 3000 tons and more, but the maximum capacity is not maintained throughout the entire year. With an eight-hour working day the annual production of an up-to-date colliery will not average much over 500,000 tons. At the rate of 3000 tons a day about 70 cars will be required to move the coal, and 45 tons per car may be taken as an average of capacity. It may readily be seen that the cost of switching such a number of cars day after day for the purpose of loading them would be extremely high.

Collieries are usually constructed with the idea of giving service for fifty years, or even more. Consequently, a careful study of the requirements of each individual plant with regard to track facilities is necessary. As a general rule a colliery has upon one side the track or system of tracks, for holding the empty cars. These are known as the "light tracks." On the other side of the breaker is another track or system of tracks, for holding loaded cars, known as "loaded tracks." Scales are placed upon either side of the breaker, between the building and these systems of tracks, for the purpose of weighing both the empty and loaded cars. These are known respectively as the "light" and "loaded" scales.

The track connections and grades are so arranged that a locomotive places empty cars only above the breaker and takes out the loaded cars below it. For the purpose of loading, the cars are run beside or underneath the breaker by gravity. The movement of cars from the light to the loaded tracks is of course not continuous. They are stopped at the light scales for weighing, spotted at the loading chute and stopped again for weighing on the loaded scale.

Grade of 1½ Per Cent. Most Desirable

The placing of empty cars and the removal of loaded ones do not interfere with the operation of loading or weighing in the least. The tracks running through the breaker and over the scales are not intended for locomotives so far as the curves and track materials are concerned. In a like manner the scales are constructed only to weigh cars and have no dead rail to permit a locomotive to cross over them.

Experience has shown that a grade of about 1½ per cent. is the most desirable for the operation of these gravity track systems. Under favorable conditions cars will run on a 1¼ per cent. grade, or even lower, but around sharp curves and over comparatively rough tracks, also for operation in winter, anything less than a 1½ per cent. grade proves insufficient. On the other hand, grades much in excess of 1½ per cent. will make it comparatively difficult to stop the cars upon the scales or under the breaker chutes.

The accompanying illustrations show typical track arrangements at coal breakers. They may be grouped into four distinct classes, the chief difference being in the method in which they are connected with the main track.

From an operating standpoint the most desirable method is to make connection with the main line for both light and loaded tracks, as shown in Fig. 1. In this arrangement, however, it is difficult as a rule to secure the necessary 1½ per cent. grade adjacent to the main line without resorting to a hump in the light track connection, a depression in the loaded track connection, or possibly both. Furthermore, if the main line has a low grade, the approach to the hump will be of considerable length and require a large amount of track. Finally, the distance between the light and loaded track connections on the main line will be increased. It will thus be only in rare instances, where the ground ad-

*Abstracted from "Engineering News-Record" of May 23, 1918.

jacent to the main line is favorable, and where the required right of way will be available for such a purpose, that an installation as shown in Fig. 1 can be made.

Track systems with connections at both ends are always expensive to install, and it is doubtful if the advantages from an operating standpoint are of much significance.

The method most frequently employed is to provide a direct connection from the main line to the loaded tracks, as shown in Fig. 2. A thoroughfare, or running track, is built alongside the loaded track to a point above the light scale where it connects with the light tracks. The only disadvantage of this construction is that it interferes with the continuous loading of cars when the locomotive places the empties on the light track. However, this operation takes only a comparatively short time, and if convenient can be carried out when the breaker is idle.

The advantages in the construction of this type of track system will readily be appreciated. This layout is quite flexible and can be fitted to local conditions in most cases. Since the grade of the track can be raised or lowered to fit the ground the grading is reduced to a minimum, while at the same time it is not necessary to have the breaker tracks parallel, or even approximately parallel with the main line. They may curve in any direction and be kept upon ground best suited for the purpose. The high ends of the light tracks are not connected with each other. It would be useless to make such a connection. Moreover, the stub ends save car capacity and reduce the length which would otherwise be required for the light tracks and the track system in general.

Fig. 3 shows a layout in which the light tracks are connected with the main line. This construction is not as desirable as the one just described, the main objection being that the locomotive does more or less switching when the loaded cars are removed. This switching necessarily interferes with the running of the loaded cars onto the loaded tracks immediately after they have been filled with coal. Whenever convenient the loaded cars should be taken away during the hours when the breaker is not in operation. Generally, however, there will be more interference in removing the loaded cars than in placing the empties on the light track. In this type also loaded cars have to be hauled up a steep grade when they are removed from the colliery.

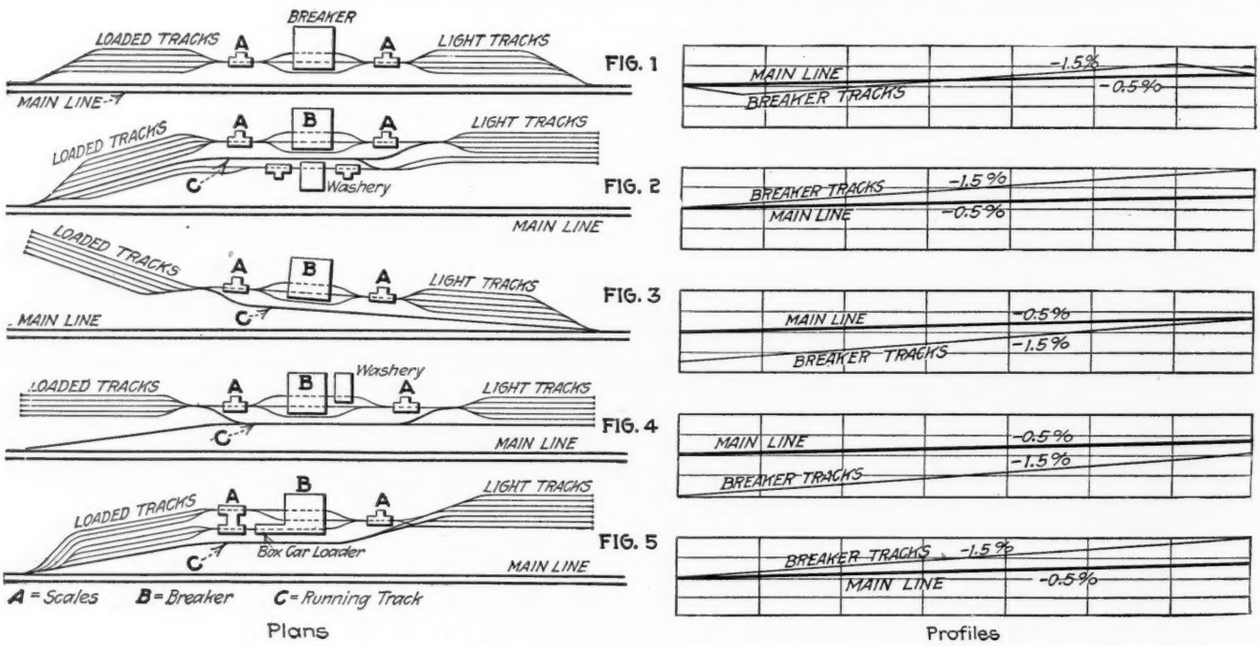
Such a track system as this is resorted to in places where the main line is on a high embankment, and where it is desired to construct the breaker on low ground beside it. In flexibility of construction there is no difference whether the light tracks or the loaded ones are connected with the main line; the difference lies in the operation alone, as has been shown.

A track system not frequently employed is shown in Fig. 4. Here the far ends of both the light and loaded tracks are disconnected, and both the operations of placing empties and removing loads will result in interference with the continuous loading of cars, because the only access to the track is over the connections alongside the breaker. Moreover, a reverse movement is necessary, either in placing empties or removing loads, depending on whether the loaded or light tracks form a continuation of the branch leading to the colliery.

From an operating standpoint, therefore, this track system is not desirable. Its advantage lies in the fact that for the same car capacity it will require less space than any other system, and that it can be readily adapted to the various conditions of insufficient right-of-way and unfavorable topography.

A construction of this type will usually be found some distance from the main line of a railroad, the difference in elevation between the main line and the colliery track determining to a considerable degree the location and grade of the branch line.

At the present time many washeries usually located adjacent to collieries are reclaiming coal from the old



FIGS. 1 TO 5. TYPICAL RAILWAY TRACK SYSTEMS AT ANTHRACITE-COAL BREAKERS

culm banks. A considerable number of these banks, however, are located at points where the collieries have been abandoned. In such cases the tracks serving the washery are extremely simple, as the capacity of such a preparation plant is only a few hundred tons a day.

Frequently a single track without scales is laid either through the washery, or beside it, the grade being made such that the cars may be moved by gravity after they have been placed by locomotive.

Where a washery is operated in conjunction with a breaker it is highly desirable to have this washery located beside the breaker, provided there is sufficient room. In such a case there will be no duplication of facilities, and the washery will be benefited by all the advantages secured from the breaker track system. It is not always possible, however, on account of lack of sufficient space to effect such a location, and frequently the washery is placed on the opposite side of the running track, as shown in Fig. 2.

Tracks serving a washery are constructed on the same principles as those serving a breaker, and parallel with them, although of course the capacity will be much less.

Sometimes existing collieries are overhauled, equipped with improved machinery and the capacity increased. In such a case it is necessary to provide additional tracks to take care of the increased output. The track system already existing and designed with the intention of occupying as little space as possible may present a difficult problem when extensions are required and expenses must be kept down.

If it is impossible to add length to existing tracks, which is not uncommon, the only alternative is to construct new tracks paralleling the existing ones, and make the best connections possible.

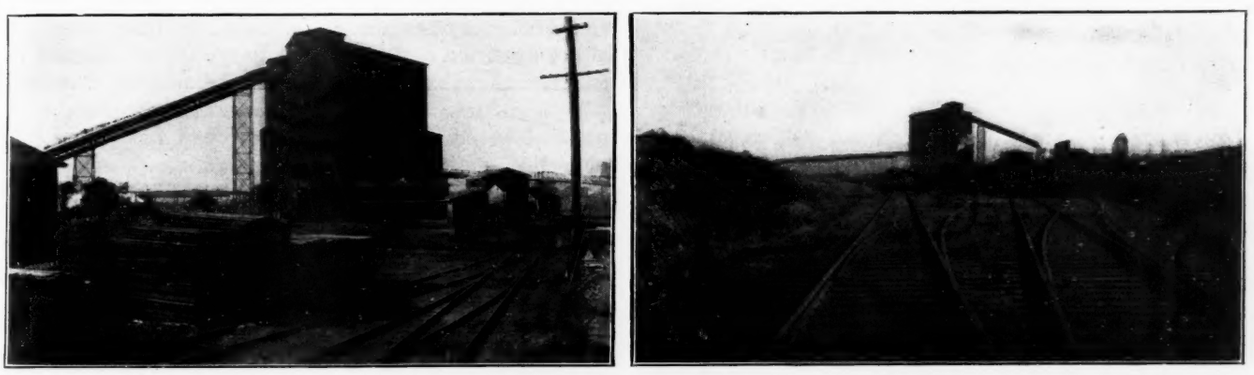
Fig. 5 shows a satisfactory method of adding to the capacity of a track system which could not be extended in length. Each group of light tracks has to be accessible to the running track (for the purpose of placing empties) as well as to the light scales. This results in a set of crossing frogs. The loaded track additions require the construction of a second loaded scale, so as to use all of the available space.

The total capacity for which the light and loaded tracks should be designed will depend not only on the capacity of the colliery, but also to a considerable extent upon operating conditions. After the daily capacity of the plant goes beyond a certain number of cars, which may be handled by one locomotive, the capacity of the tracks may have to be only slightly in excess of this, because the switching service can be so timed that empty cars will always be on hand. For instance, a train of empties may be placed early in the morning and another one early in the afternoon.

The rail employed in the construction of breaker tracks is usually "relayer," and in places where the track is not traversed by locomotive this may be as light as 62 lb. per yard. Turnouts through which locomotives run are usually No. 8's; but those which only take cars may be No. 6's or even No. 5's. In order to save as much room as possible turnouts are frequently designed on the style of the old three-throw stub switch, except that the two switches are about 25 ft. apart and the frog is not in the center of the main track.

Formerly scales 38 ft. long were ample, but at the present time the length of cars has been increased so that 42-ft. scales are too short, and 50-ft. scales are being installed.

To facilitate the filling of box-cars, which are quite common nowadays, to their full capacity, box-car loaders of various types are being employed. One type of this device consists of a vertical turntable on which the cars are placed and revolved through a vertical arc, first one end of the car being lowered and filled with coal and then the other.



FIGS 6 AND 7. LIGHT TRACKS SHOWN IN THE LEFT-HAND VIEW, LOADED TRACKS IN THE RIGHT

Modern collieries also have facilities for the economical handling of condemned coal. Cars condemned for having too much slate are taken by locomotive from the loaded track and replaced on the light track. From here they run by gravity over a hopper pit, just above the breaker, where they are emptied and again spotted for loading. The condemned coal is taken by a conveyor back into the breaker for retreatment.

One of the outside tracks of the breaker is frequently used for the unloading of supplies of various kinds, such as mine props. Sometimes, also, there is an extra track leading to the power house, where fuel may be unloaded. Provision for such track forms a variation in the layouts as shown in this article.

The temperature in a boiler furnace is about 1400 deg. C. At this temperature oxygen reacts with the combustible material to be burned very rapidly, but proper conditions for reaction must be provided.—*Bureau of Mines Bulletin No. 135.*

Some Reasons for Industrial Discontent*

BY IRVING FISHER
Professor of Political Economy, Yale University

IN ORDER that labor shall be contented we must understand the psychology of the workingman. We must satisfy his great fundamental human instincts. I believe there is a field for what might be called industrial psychiatry. I have talked about this often in my classes but have been rather hesitant to say anything about it publicly; until recently I have discovered that a number of other people have been working along the same line and have reached substantially the same conclusions.

Among these is at least one practical employer of labor, Robert B. Wolf, who has shown, in the wood-pulp industry, that it is possible to make the work itself interesting to the laboring man. I believe that herein lies the hope of solving the great industrial problem of labor discontent more than in any other direction. I think that if employers would join Wolf and the few other employers who have gone into this line, studying the psychology as well as the physiology of labor, and try to adapt conditions of work to the needs and yearnings of labor, labor discontent will be diminished far more than by any other method I know of.

MUST SATISFY FUNDAMENTAL HUMAN INSTINCTS

As I see it, any human life in order to be a successful human life, must satisfy six or seven of the great fundamental human instincts. In my classes I have been enumerating them as follows: First, there is the instinct of self-preservation, about which little needs to be said, because we all recognize it. The trouble is, we harp too much on that one string. We think that is all the workman is interested in; that his interest is confined to his pay envelope. Undoubtedly that is the most fundamental thing. But there is also the instinct of self-expression, or the instinct of workmanship; there is the instinct of self-respect and respect for others; there is the instinct of self-sacrifice or heroism; the instinct of love, or the home-making instinct; the instinct of loyalty; and possibly, whether it is innate or not I do not know, the instinct of worship. If we examine the misfits of life, those who fill our insane asylums, our prisons, our hospitals, you will find that they are made up of people who have not been able to satisfy all, or possibly any, of these fundamental instincts.

In order that the laboring man may live his life, he must satisfy something more than the instinct of self-preservation. His life cannot amount to much if it merely consists in keeping body and soul together. And yet, with strange blindness, the employer assumes that the only thing his employee is, or can be, interested in is his wages. Hence these ingenious schemes, like the Taylor system, for trying to get more work out of labor consist entirely of thrumming on this one string—trying to hold out a bale of hay for the donkey, and as he approaches it, making him walk the faster to reach it. I believed thoroughly in these systems, and in piece work, until I began to understand what at first had appeared to me strange, the objections on the part of the laboring men, though they did not and do not themselves understand the nature of their objections. Their souls are hungry and thirsty to satisfy these great instincts, but they do not know it.

Now, what Robert B. Wolf did was to restore, in the first place, the instinct of workmanship, which has been subtly abstracted from industrial life through specialization of work and division of labor. Originally a man was interested in his product, just as an artist is interested in his picture. But today, with the minute division of labor, a laboring man sees his work sweep by him, a peg in a shoe, a bolt in an automobile, and since he is not able to visualize his part in the product his work ceases to be interesting and becomes drudgery.

He wants to shorten his hours; and the employer, whose work is interesting, whose work is his life, cannot understand why the employee is always trying to shirk, whereas he himself is willing to work twelve or sixteen hours a day. The reason is that in one case the instinct of workmanship is satisfied and in the other case it is not. I have sometimes thought how much wages I would have to be paid to give up my job to put pegs into shoes or to take up other monotonous work.

If you paid me $1,000,000 a minute, I would not give up my work and go into an automobile factory or a shoe factory. I might for a few minutes! But if it meant sacrificing my life work, I would prefer suicide, after having had a taste of the satisfaction that comes from doing work which I love.

EACH MAN SHOWN HIS PARTICULAR WORK

What Wolf did was to show each of these men, or some of them, what their own particular work was. At first he tried to introduce the Taylor system, but those associated with him practically forbade it. So he put into operation a system of charts whereby men could record by a series of curves just what was happening at each stage of the process. They watched their records, and did more work than could have been gotten out of them by the Taylor system.

The men in this wood-pulp factory have to raise gradually the temperature of the cookers into which the chips go, keep the temperature there for a certain number of minutes, then raise it again, and so on through a certain cycle in order to get the results. Eight years ago when Wolf went into this plant they were making, if I remember correctly, with a certain equipment 100 tons of the worst wood pulp in the country.

Today, with the same equipment, they are making 200 tons of the best, and the transformation has been due to giving these men a record of their work and getting them interested in bettering this record. Meanwhile, wages have arisen 40 per cent.; there have been no strikes; the men are loyal to the organization; and the industrial problem has been largely solved.

All day these men trace with a lead pencil their work. Their own part in making that wood pulp is that little

*Closing remarks in the presidential address of the American Association for Labor Legislation delivered at its eleventh annual meeting held in Philadelphia, Penn., Dec. 27, 1917. The title of the address is "Health and War." Copies of the unabridged address are being distributed by the author.

picture or graph. And they are just as much interested in making that picture every day as an artist is in painting a new picture. It is theirs. They get credit for it from their fellows and in the eyes of their boss.

There is more in the system, because Wolf has tried to satisfy also the other great natural instincts, the instinct of self-respect and respect for others, the instinct of loyalty; making them feel as though they were human beings—his brothers, instead of a lower order of human beings interested only in their pay envelopes.

Would you try to limit the instinct of a soldier merely to his pay envelope? Would you try to make a soldier go over the top by bribing him? Suppose President Wilson had said to General Pershing: "Now, Pershing, I want to be sure you are always on the job, and not skimping it. I have developed a Taylor system by which your wages will go up or down according to your victories."

What do you suppose Pershing would have said? He would have said: "Mr. President, what do you take me for? Of course I must live. But I am not primarily interested, or only interested, in my pay envelope. The motives which are sending me to France are loyalty to my country, heroism, the desire to sacrifice myself, to satisfy my instinct of self-respect and the respect of others, and may be to win some glory. Idealistic motives spur me and keep me at work."

And now we are taking men out of the factory and sending them into the trenches, when the only stimulus we have played upon in the factory has been the pay envelope; and yet these same dormant higher motives are there and will operate to make good soldiers. They could be enlisted to make good workmen. I hope that this may be one of the lessons of the war.

After this war we must apply science to industry, in a way to make industry more wholesome and healthy; which means not only better sanitation and ventilation, not only how to make the workman keep his bodily functions going properly, but how he may obtain mental health so that he may live, as Professor Alfred Marshall says, a complete all-around life. And if we are to say that the world owes every man a living we should mean not only that it owes him wages but also that it owes him the full expression of the fundamental instincts of a human being.

Storage of Bituminous Coal

The more general storage of coal during the spring and summer months is coming to be recognized as the only practical means of avoiding a coal shortage during the winter. Many corporations and individuals will this year undertake, for the first time, to store large quantities of coal.

The storage of bituminous coal presents certain difficulties because of its tendency toward spontaneous combustion with its attendant dangers and losses. The methods to be employed in avoiding spontaneous combustion have not generally been well understood and those which have seemed successful in some cases have failed in others.

The Engineering Experiment Station of the University of Illinois has just completed a study of the problems involved in coal storage and has published the results in a 200-page illustrated book designated as Circular No. 6, "Storage and Bituminous Coal." The study was made under the direction of H. H. Stoek, Professor of Mining Engineering. The reasons and advantages of storing coal are given, the kinds and sizes of coal which may be safely stored are described, and the many factors entering into successful storage are discussed.

Copies of Circular No. 6 may be had by addressing the Engineering Experiment Station, Urbana, Illinois. The price is 40c. a copy.

HELP YOURSELF

BY RUFUS T. STROHM

WE'RE apt to be filled with envy
At the mention of the chap
Whom circumstance, by a lucky chance,
Has tossed into Fortune's lap;
For the ordinary mortal
Is a poor and hapless elf,
And the best that he can expect to see
Is a way to help himself.

IT'S a comfort to the climber
Who would scale the mountain wall
To know a friend is at hand to lend
Swift help should he chance to fall;
But the man who scans most keenly
Each inch of the rocky shelf
Is the lonely wight on the dizzy height
Who is forced to help himself.

THE strides that the race is making
In its struggle toward the light
Have come by the throes and the sweat of those
Who have had to work and fight;
For earth doesn't owe its progress
To the Guildford or the Guelph,
But in shire and town to a Jones or Brown
Who has learned to help himself.

THE gawk who inherits millions
Has a cheap cause to be vain,
Since not one sou of the sum is due
To his use of brawn or brain;
But the engineer who labors
As he garners in the pelf
Has the cheering thought that his wealth is wrought
By the way he helps himself.

Reprinted from "Power."

To Enforce Loading of Clean Coal

The following new regulations, which are expected to insure the production of clean coal, became effective on June 1:

No bituminous coal will be permitted to be sold, shipped or distributed if it contains such quantity of rock, slate, bone, sulphur, fireclay, shale or other impurities that it would not have been considered merchantable prior to Jan. 1, 1916.

Shipments from bituminous coal mines in which the coal is naturally of such character as to be unfit for market may be prohibited by the Fuel Administration. Operators of bituminous mines whose products are capable of being made merchantable by complying with the requirements of the Fuel Administration in regard to the removal of impurities, and who fail to comply with those requirements, will be required either to unload and clean such coal, if it has been loaded into cars or bins, or to deduct 50c. per ton from the Government price. In the event of repeated violations on the part of such operators, such further action will be taken by the Fuel Administration as it may deem advisable.

The enforcement of these orders devolves, primarily, upon inspectors appointed by the district representatives. These inspectors are required to familiarize themselves with the conditions under which coal is produced and prepared for market in the particular territory to which they are assigned, and to advise mine operators and employees of such methods as the inspectors may deem necessary to bring coal up to the standard; to inspect coal-mining operations in their respective territories; and to make daily reports to their several district representatives.

Copies of these reports, with the recommendations of the district representatives thereon, will be forwarded to the Fuel Administration for final action.

The United States Fuel Administration also made public an order under which operators of bituminous coal mines may receive a special allowance for coal mechanically washed or extraordinarily cleaned or picked in such manner that the fuel value of the coal will be substantially increased by the removal of waste and impurities. No special allowance, however, will be made for the ordinary method of cleaning or picking coal

The amount of the allowance contemplated by this order will be determined by the Fuel Administration, and will be set forth in a permit to be applied for and obtained by such operator in conformity with the provisions of the order.

Coal-tar products, valued at nearly $200,000,000, were produced in the United States in 1917, it is announced by the United States Tariff Commission, which recently completed a census of the coal-tar industry.

New Coal Prices in North Dakota

New prices for coal produced in North Dakota have been fixed as follows: South of the 12th parallel, run-of-mine, $2.25; prepared sizes, $2.50; 6-in. steam lump, $2; slack or screenings, $1.25. North of the 12th parallel, run-of-mine, $2.70; prepared sizes, $3; 6-in. steam lump, $2.50; slack or screenings, $1. The wage allowance of 45c. may be added to the prices.

Delayed Coal Delivery Causes Discontent

Considerable discontent is evidenced by domestic consumers, judging from letters reaching the Fuel Administration, because deliveries of coal are not being made. The Fuel Administration is trying to call every one's attention to the fact that, while it is very necessary to place orders now, this does not carry with it assurance of immediate delivery. The booking of the orders is a necessary factor in the working of the Fuel Administration's plan, and every precaution is being taken to assure adequate supplies to all domestic consumers this winter. It would be unwise in many instances, of course, to interfere with essential transportation to deliver coal which will not be used for several months.

Weekly Production Statistics

Bituminous coal production reached a new high point during the week ended May 25, when it exceeded by 6000 tons the production of the week ended May 11. The total production for the week was 11,811,000 tons. Anthracite forwardings fell off slightly as compared with those during the week ended May 18. The total forwardings during the week ended May 25 were 40,752 cars.

Beehive coke production fell off 2 per cent. The output during the week ended May 25 was 664,000 tons. Byproduct coke production during the week under review was 484,333 tons, a slight decrease over production during the preceding week.

Telegraphic advices regarding production for the week ended June 1 indicate that there will be a sharp decline in production for that week. This is due largely to the observance of Decoration Day as a holiday. The foregoing estimates are those of C. E. Lesher, the geologist in charge of statistics for the United States Geological Survey.

Dr. Garfield Appoints General Solicitor

W. T. Alden, a Chicago attorney, has been appointed general solicitor for the Fuel Administration. Owing to the growth of the Fuel Administration and the development of its functions, the work of its legal section has assumed large proportions. It interprets and defines the jurisdiction and powers of the organization under the law and prepares all executive orders and regulations. This is in addition to widely extended activities through the various sections of the administration.

Lack of Orders in Western States

Mines in Iowa during the week of May 18 lost 13.5 per cent. of their production due to lack of orders, according to the Fuel Administration. Losses were shown in other Middle Western and Western states for the same reason. This condition could be avoided, Dr. Garfield states, if domestic consumers would place their orders at early dates. A large portion of the domestic orders in the bituminous consuming region have not been placed. Losses, attributable to that cause in other states, during the week of May 18 are as follows: Rocky Mountain states, 10.8 per cent.; Oklahoma and Arkansas, 4.3 per cent.; far western states, 2.8 per cent.; Kansas and Missouri, 2.6 per cent.; Indiana, 2 per cent.; Illinois, 1.4 per cent.

Allotment of Anthracite Now Fixed

Anthracite production during the coal year, which will end Apr. 1, 1919, will be 89,000,000 long tons, it is estimated by the Fuel Administration. Of this amount, 54,345,783 long tons, it is expected, will be available for domestic consumption. This is 5 per cent. more than was distributed for domestic purposes during the last coal year. The difference between the total production and that available for domestic consumption represents the amounts used at the mines, by industries and by the railroads.

New England is to receive 16.95 per cent. more anthracite for this year's consumption than was used in that section last year. The Atlantic states have been allotted 12.69 per cent. more than they had last year. Canada will receive 6.59 per cent. less anthracite than last year. Reductions also will be made in the supplies for the Middle West and the Northwest. None will be sent west of the Mississippi or south of the Potomac and Ohio Rivers.

Coal Distribution Plans Now Complete

The matter of fuel priorities is rapidly assuming its final form. Some of the brightest minds, both in and out of the Government service, have been working on this question. No attempt is being made to conceal the fact that many of the nonpreferred industries will be severe sufferers from lack of fuel this winter. There will not be enough coal to go around. Instead of the uncertainties of last winter, however, systematic distribution will be made. Domestic consumers and the preferred industries will have coal enough. Plans, which give this assurance, already are complete.

No Anthracite for Industrial Plants

Use of anthracite coal for steaming purposes was an important contributing cause to the shortage of domestic fuel in New England last year, the Fuel Administration believes. For this reason, an order has been issued forbidding any dealer to deliver anthracite to an industrial concern without a certificate of exemption from the Federal Fuel Administrator.

To Solve Car Distribution Problem

With the railroad fuel matter settled, officials of the Railroad Administration and the Fuel Administration are engaged in working out plans for the distribution of cars. While "a car is a car" under the present plan, which abolishes assigned cars, there nevertheless are numerous problems which must be solved. One of these is the treatment to be accorded privately owned coal cars. There is one company which owns $4,500,000 worth of cars. No solution in this matter has been reached, but it is probable that the company owning the cars will be given the privilege of using as many of them as can be handled without delay, but none of them will be allowed to stand idle.

Effort Made To Insure Clean Coal

While numerous cars are being found to contain dirty coal, it is pointed out at the Fuel Administration that the great majority of operators and workmen in the mines are being more than ordinarily careful to send out clean coal. The cases where this is not being done are regarded as exceptions and rapidly are being ferreted out. The penalties being imposed are having the effect of straightening the matter out where there have been delinquencies in this respect.

An increased force of inspectors is now in the field for the Fuel Administration. As it is inconceivable that any mine operator or mine workman should be unaware of the imperative need to conserve railroad transportation facilities, no leniency is to be shown in cases where an undue percentage of dirt has been loaded with the coal.

Brief Washington Notes

A fuel administrator for Alaska probably will be named in the near future. At present the Alaskan field comes under the jurisdiction of the state administrator for Washington.

Great difficulty is being experienced in meeting the rapidly increasing demand in the East for smokeless coal. That the Fuel Administration was justified in restricting the use of this class of coal and in cutting it off from Chicago and other cities is held to have been demonstrated.

F. J. Goodfellow, of Bradford, Penn., has been named a district representative of the Fuel Administration for the charcoal-producing region east of the Mississippi. A need for a more systematic allotment of charcoal became evident and Mr. Goodfellow was entrusted with its administration.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

In all parts of the Union labor is working steadily on all occasions when cars are provided. In some places, however, no great enthusiasm is being shown. Short hours and total absenteeism make it impossible to secure the maximum tonnage of which the mine-working force is capable. The men in some cases do not visualize the war, nor do they feel any incentive driving them onward to maximum production.

In a recent issue of the *United Mine Workers Journal* an account is given of the subscriptions of the mine workers in Washington to the Third Liberty Loan. In some towns where there are a number of people not engaged in mining the quota was largely over-subscribed. In Carbonado, for instance, the subscription was 733 per cent. above the quota. But quotas are quite deceptive bases for estimation, and the possibility of a number of nonmining contributors cannot be overlooked. Casting out these records, however, we find that 129 men at the little town of Tono, in Thurston County, just south of Seattle, purchased $23,000 of bonds—just $178.29 per man. But the little town of Fairfax, in Pierce County, did better. Fairfax's contributors only numbered 62 men, but they bought $17,000 of bonds, or $274.20 per man. Talk about "lengthening the worker's stride"—you couldn't lengthen that stride much. It is a long jump in itself—such as a Westerner might be expected to take. Three hundred men at New Castle did not do so well, but even they subscribed for $18,000 of bonds, or $60 apiece. Men who buy bonds like the men of Tono and Fairfax must be and will be workers. They live rigorously and work stupendously that our Nation may live and not die.

MY KNOWLEDGE of the miner leads me to believe that, given the proper opportunity, he is willing and anxious to enter into team work with his employer, the Government and all concerned. Only by this method can maximum results be obtained. The miner has always been a man who loved his independence, and approached in the proper spirit he can be relied upon to contribute his full effort. He will coöperate, but cannot be driven. In this spirit of coöperation the sucess of the mining industry, as well as of all other industries, lies. The coal operator who desires to obtain the best results from his men should approach them in this spirit, and the response will be wonderful.—John P. White at International Railway Fuel Association meeting.

Sergeant H. Austen Beck, formerly of the 1st Battalion, Canadian Infantry, has for two months been aiding the United States Fuel Administration by making speeches in coal-mining villages. He is the son of N. D. Beck, Supreme Court Justice of Alberta, Canada. Invalided by reason of shell shock and gas, he has been able to tour West Virginia, Tennessee and Kentucky towns.

He says: "If there is any lack of patriotism in the United States it can be charged to ignorance of the true conditions in France. The miners and other workers in the little out-of-the-way places are hungry for news. The Fuel Administration sent us, four returned soldiers of the speaker's staff, at the invitation of a committee of workingmen to mining towns in West Virginia and Tennessee. In many of these places we were the first visitors who had actually been in the fighting. In Pruden, Tenn., the miners increased their output by 300 tons the day following our visit and planned to continue this good work. At Petros, where the Tennessee state mine is located, we read the President's "Buy another bond" slogan. As a result, the town's quota was oversubscribed thirteen times."

To this testimony nothing need be added. Where the truth is apprehended the response is unquestioned. The Evans Coal and Coke Co., of Connellsville, Penn., with about 250 men, announces that every man contributed to the second war fund of the American Red Cross. The contribution was $100 from the company and from the employees $524.25. The Illinois and Kentucky papers will please not copy this item. Our news notes of May 25 exhibit how much larger was the offering of Illinois, and the Labor Situation of the same date showed how much more generous was the outpouring from Kentucky. Yet the Evans men stand well above many of their fellows in Pennsylvania.

In the anthracite region the mine workers of the Hillside Coal and Iron Co. and the Pennsylvania Coal Co., Erie affiliations, gave the Red Cross $16,000, the Ewen mine leading with $2815. The larger contribution is somewhat over $1 per head. As the average for the whole country was $1.75 per capita and $4.25 per person employed in industry, the gift does not appear commensurate with that made by others.

The gross income of the American people is said to be $40,000,000,000 a year. The Red Cross apparently secured from out of this $175,000,000, or about $1 in every $229. Thus the average gift of the American people was one day's income in every 9 months of steady work. Judging by this the Illinois mine workers who promised a dollar a month and the Kentucky men who gave a full day's work sensed the nature of their obligations with fair accuracy.

A Red Cross four-minute man in New York City somewhat startled his audience the other day by appealing for their nickels and dimes. If it be true that 6,000,000 people in that city gave about $34,600,000 and that 40 per cent. of the people receive an income from services rendered, then the amount contributed was $5.75 per person and $14.40 per income-receiving unit. From this it will be seen that people are giving generously—not in dimes, but in days, some even in weeks, of income.

In reply to an inquiry Van Bittner, president of District No. 19, informs us that every member of the United Mine Workers of America in that district, which comprises southeastern Kentucky and Tennessee, gave to the American Red Cross the proceeds of the first day's work performed during the week of May 20, in accordance with instructions issued by the district officers of the United Mine Workers. Owing to this generous contribution the coal mining districts of southeastern Kentucky and Tennessee oversubscribed their Red Cross quota 500 per cent.

At the Dorrance colliery of the Lehigh Valley Coal Co., near Wilkes-Barre, Penn., the mine workers cornered Stanley Brucchi, a man about 45 years of age, and demanded that he withdraw his positive refusal to contribute to the Red Cross. When he repeated his declaration Brucchi was grabbed and hurled into the colliery reservoir. After a good soaking he consented to make a contribution to the Red Cross.

As stated May 25, the Maxwell No. 2 colliery of the Lehigh & Wilkes-Barre Coal Co., at Ashley, recently had a strike. A second suspension for substantially the same reasons laid the mine idle May 28. The strike lasted two days and caused a loss of tonnage of about 2500 tons. On

May 29 the men agreed to go back to work if certain demands were immediately met by the company. This second strike seems to have caused a severe split in the ranks of the men, the president of the local, Thomas Moran, resigning, and another man being elected in his place.

The officials in District No. 1, the northern district of the anthracite region, are determined to prevent locals from calling strikes that violate existing contracts between the union and operators. They have instituted proceedings against the officers of a local at Laflin, Luzerne County, charging a misuse of the funds of the local treasury in the conduct of an illegal strike. The union has given the officials an opportunity to return the misappropriated funds. Seven of the 16 officers of the Ridgewood colliery local were arraigned on May 29 before an alderman, the auditor of the United Mine Workers of America charging them with conspiracy and of receiving money under false pretenses. The men were held in $500 bail.

The illegal strike mentioned was against a certain foreman, to whom the men took exception, and it lasted from Jan. 17 till Feb. 18. During the course of the strike the local officers paid money to committeemen who were engaged in attempts to prevent other men from displacing the strikers. Eight of the officials thus offending have refunded the money, but there are still seven that the union deems should make a return of monies believed to be wrongfully expended. The United Mine Workers say they will take the case to the highest courts and make every effort to obtain a conviction.

Still the Hard-Coal Men Will Button Strike

The Honey Brook No. 5 colliery of the Lehigh & Wilkes-Barre Coal Co., at Audenried, is also tied up by a strike. This mine is in the Beaver Meadow district near Hazleton—a long way from Ashley, which is in the Wilkes-Barre field. The strike has been called by the local union because some of the members of an Italian local would not pay their dues. The men have been termed members of the Industrial Workers of the World, but that is not true. They are merely delinquents who will not pay dues either to the local union or to any other organization. By this strike about 500 men lose several days' pay and the country loses thousands of tons of coal, all to balance the books of a small local.

The Huntingdon and Broad Top Region has, at least temporarily, composed its troubles and none too soon, if it be true, as stated, that a riotous disposition developed among the miners which made the mine owners at Rockhill apply to the sheriff for a force of deputies to protect the works. The disaffected men, it is said, tried to induce the pumpers to leave their jobs and let the mines flood with water. The State Police assisted the sheriff's deputies in keeping order.

Broad Top Men Consent to Await Arbitration

However, after three weeks of idleness, the 2600 men decided that they would go back to work. Representatives of the mine workers on Friday, May 31, and on Saturday, June 1, held an extended conference in Washington with Fuel Administrator Garfield. The Fuel Administrator took the position that production must not be interrupted pending the adjustment of the controversy.

The officials of the union returned to the Broad Top Region with Rembrandt Peale, one of the representatives of the Fuel Administration. At a meeting of the representatives of the various locals June 4 the delegates unanimously voted to return to work pending arbitration of the matters in dispute.

The strike was called for the purpose of enforcing the continuance of an agreement to pay a bonus of 10c. a ton which was in effect last year and which the operators contracted with the men to pay till the first of April. When that date arrived the operators reduced the rate of pay and the men, for a while, continued at work but finally struck about May 9.

President W. M. Rodgers, of the Monongahela Valley Labor and Trades Council, of Fairmont, and president of the West Virginia Federation of Labor, stated recently that a conference was held a few days ago at which C. W. Watson, George T. Watson, J. O. Watson, Frank J. Hayes, president of the United Mine Workers; R. C. Valentine, of the Official Board; Frank Keeney and Fred. Mooney, president and secretary of District No. 17, respectively, were present. It was agreed that there should be no blocking of the organization in northern West Virginia. Six or seven organizers are hard at work in the Fairmont district and the organization seems securely planted at several mines; P. K. No. 25 being one of the first.

The hope that Madison County, Illinois, would renovate itself in the world's opinion by convicting the 11 men charged with the murder of Robert Paul Prager, a German enemy alien, in the name of loyalty, was not realized. Though one of the defendants had confessed that he was the leader of the mob and though strong evidence was presented against the others, the jury on Saturday afternoon, June 1, returned a verdict in the Edwardsville Circuit Court acquitting all the defendants and this after being out only 45 minutes.

While he denied that his clients killed Prager he contended that the man was killed by "good loyal citizens, men of middle age, who feared that their lives were in danger when working in the mines," yet 8 out of 11 defendants, including Joseph Riegel, the confessed mob leader, were coal miners.

Prior to the lynching, which took place at Collinsville Apr. 5, Prager had tried to get into the miners' union at Maryville and statements attributed to him had been interpreted as hostile to the country and a suspicion was abroad that he wanted to get into the mines to blow them up. No proof was offered at the trial or elsewhere, however, in support of these rumors.

An "Unwritten Law" of Enemy-Alien Murder

In the trial "loyalty," as a synonym with "lawlessness," was invoked in every possible way. A frank effort was made to obtain the acquittal of the defendants under the unwritten law. Although Judge Bernreuter ruled that disloyal utterances, even if proven, afforded no justification for mob murder and though he excluded testimony intended to set up that sort of justification, the defense contrived to inject the "loyalty" question in one form or another, and the arguments of the attorneys for the defense were confined largely to a justification, on "patriotic" grounds, of the acts of the mob.

Riegel, who had confessed to the coroner's jury and to a newspaper reporter that he was the leader of the mob, repudiated both confessions when placed on the stand. He and most of the others claimed that they were innocent bystanders. The remainder denied that they were present at the lynching. There was wild disorder in the courtroom when the verdict was announced. Friends of the defendants cheered and an impromptu parade was formed, with the acquitted men marching as heroes at the head of the column.

Judge Bernreuter instructed the jury plainly that the war had nothing to do with the matter. It was simply a case in which a helpless prisoner was taken from jail and murdered. He declared that it was as unlawful to murder an enemy alien as to murder any other man.

Michigan is still restless. It lies so far off the beaten track of the coal miner that we are apt to overlook its activities. The miners are seeking in the Saginaw district an increase of 10c. a ton. Fuel Administrator Prudden, temporarily at least, refuses to concede it. Mr. Prudden met the mine workers' representatives about May 28 and they returned home to report. The miners have been favorable to a strike which was to start June 1, but apparently, on due consideration of what it would involve, the delegation did not favor any such action.

In Alberta, Thomas Biggs, the president of District No. 18, of the United Mine Workers of America, has settled the case brought against him by William Williams, a coal miner, by a complete apology. Williams had brought suit against Biggs charging criminal libel. He had also been suspended from the union and he brought an action against the Wayne local demanding reinstatement. This was also granted

EDITORIALS

NO ONE can deny that there would be undoubted charms for all of us in a state of things where every act we performed would be for the common fund and not for personal advantage. Little as the hope is that such an idyllic condition can ever be attained, we must never forget that in taking stock of motives there are two imperatives which make it possible to dream socialism though not to encompass it. These two imperatives, which have a great power and value in our present and immediate social life, are altruism and industrialism. Irving Fisher, professor of political economy, Yale University, in an article we publish this week, has called the former the instinct of self-sacrifice, or heroism; the latter he terms the instinct of self-expression.

The war has laid bare the first of these—the instinct of altruism. It is by no means dead in any of us. If socialism ever becomes something more than an academic theory of things that might be, it will be largely because of the instinct for altruism that lies in most of us, the natural craving for service that is deep-seated in the hearts of us all. During the present war this spirit has shown itself, first of all, in voluntary enlistment, then in the readiness of civilians to accept and perform unpaid service, later in the willingness of the public to permit of the conscriptive army, navy and aviation services, and to propose and support measures of taxation and price regulation of the most drastic kind.

It has been shown also in all forms of self-abnegation, in the purchase of bonds by people who thought far more of the service than of the investment, and in the generous gifts to the many great funds by which the works of mercy of a great war are made possible. The spirit of altruism, of self-sacrifice, of heroism, or of service, whatever we may term it, is still in the world however much in peace it may be overlaid by prudence and covered by a load of baser motives.

* * *

AND the other motive, that of self-expression, workmanship or industrialism, is not a bit less lacking. They who are socialists in name only urge that men are wedded to their fetters. They are indeed wedded to their work, but that work is usually no fetter. It is rather a labor of love. In this connection we may profitably study on page 1066 Professor Fisher's most interesting remarks on our social instincts.

Fisher has well said that a man in his work seeks something larger than the means of livelihood. He frequently hangs to his job because he has put his personality into it, because he feels also that in it he has accomplished something for somebody. If socialism ever comes about in "the rolling of the spheres," it will rely most on those who least believe in it—on the altruist, with never a bad word for his fellow, and on the plodder enamored of his task.

WE SHALL find the managers, secretaries and foremen of our great industrial organizations the backbone of our new institutions, as they are the backbone of the present institutions, as they must be indeed the backbone of all institutions however planned and wherever set in operation, if those plans are to arrive at a happy fruition.

No man in whom the instinct of getting, the instinct of crowding others, is plainly manifest has a chance in the conduct of a modern business for a modern corporation. We have long realized that men with such a viewpoint do not make good executives. A man must have the ideals of service and the love of good workmanship, in and for themselves, if he would fit into places of such trust.

Such men would be the very life of a socialistic condition, and not those who urge socialism so blatantly. The soap-box orators have caught hold of a holy thing and desecrated it by their worship. To them socialism is to be sustained by the spirit of greed and the spirit of envy, the only spirits to which they are subservient and which they understand.

* * *

BUT to what end is all this talk about a condition that is hopelessly remote if it can ever be—if indeed it ever ought to be. Just this. The spirit of service and the spirit of workmanship are integral parts of the spirits of men. No man is happy who cannot serve them in a degree. Community service gives a chance for the development of the first; therefore, foster that spirit in every mining village. Let every man have an opportunity for some free service to the community that this good spirit may grow in him, satisfy him and make him noble and happy. The employer will undoubtedly gain by this development, not only financially but in other ways. The employer, like his employee, has those nobler instincts which are only satisfied and fed by service and the opportunity for it, and the good which comes to his mining village will rest as a benediction on his own heart.

As to the spirit of workmanship, let its existence never be forgotten. Give every man a pride in his work. Let him learn the joy of high accomplishment. Let training be given, not for the purpose of creating discontent with the common round, but with the idea of making the work the man has to do worth while.

* * *

NOT every rookie has "a marshal's baton in his knapsack," and yet we train the private soldier. We do not drill and coach him with the idea of making a sergeant, much less a general, of him, though we would not begrudge him the place if he could fill it. No, he is drilled and instructed to the end that he may be a good soldier in the squad, and so that he may have pride in a soldier-like performance of duties. So also

in the industrial army. Every man should exercise body, mind and spirit in his daily labor. It should obsess all his powers, at least in working hours. It should elevate and inspire him. Its skillful accomplishment should feed not only his body, but his mind and his heart.

Because some men will never reach the place of leadership and authority is no reason for depriving them of the sustaining pleasure that comes out of the skillful performance of labor. Something of "art for art's sake" should enter into all our employments and give to them dignity and to their artificers mental and moral stature. Not the boss only, but the worker also, should be a craftsman in the art of mining.

An Accident That Never Occurred

THERE has been a great deal of ingenuity used to anticipate the possibility of accidents from acetylene lamps. There are dangers connected with them, of course, but they are less frequent and harmful than the dangers to be found in the use of other open lights.

The most unsubstantial of all charges against the system of lighting is the possibility of the acetylene entering into chemical union with the copper of the lamp, forming thereby a compound of such unstable character as to make a disastrous explosion conceivable. Strange to say, this accident never happens. It remains one of the unexperienced possibilities. Time surely has removed it from among the probabilities.

The danger seems to have had equal consideration in Great Britain with that it has received here. Henry Louis introduced the question of the danger at a recent meeting of the Institution of Mining Engineers of Great Britain. He advocated that acetylene lamps be always made of steel, tin plate or some similar metal, and said that copper and brass should be avoided. He added that a man with a brass acetylene lamp was running a risk he had no right to run. And yet he "freely admitted that he had never heard of an accident that could be traced to that cause." With the many real causes of accident, it seems purely academic to refer to the possibility of an accident, the like of which has never yet occurred so far as can be ascertained and would not in all probability do any extensive damage if it did occur.

William Maurice added that hundreds of thousands of brass acetylene lamps were in use, yet practical experience proved that no risk of the kind suggested was involved thereby. He stated that "the use of copper and brass vessels for acetylene lamps had been officially investigated in England, France and other countries, and it had been definitely and authoritatively stated that there is not the slightest risk in using brass vessels."

By scratching the inside of the copper acetylene lamp with a nail flashes of light have been obtained, but no explosion. The fact that the outcome of these flashes was not an explosion would seem to substantiate the notion that an explosion is entirely improbable. The choice of metals, therefore, should be based wholly on commercial grounds. If an iron or tinned container will give satisfaction there is no reason why it should not be used. Acetylene lamps, while quite inexpensive, have only a limited life and anything that reduces their cost will add much to their value and popularity.

The Submarine Menace

THE pirate Hun in his sneaking U-boats has appeared off the coast of the United States and has started his work of destruction on American shipping. It is interesting to note that one of the vessels escaping from the raiders was a steamer bound for New England with a cargo of coal.

Temporarily demoralizing as may be the effect of a submarine campaign waged upon this side of the Atlantic, it is at least gratifying to know that thus far the Hun has chosen here to play more nearly the part of a man. So far as is known to the general public, at least, his raids upon our commerce have been "decent"; that is, they have been in accord with the principles of international law and bear little semblance to the "frightfulness" of some of the sinkings that have been perpetrated across the Atlantic.

The present depredations of the U-boats are particularly interesting in that they may exert a powerful bearing upon the normal movement of coal by water to New England. It has been the intention and desire of the Fuel Administration to greatly increase this movement. The presence of undersea raiders may, however, render it necessary to move a greater tonnage all-rail than has been intended. A slow-moving collier or a tow of coal barges would doubtless be an easy prey to the Hun pirates. On the other hand, such a cargo should be easy of convoy and might offer a tempting bait wherewith to lure the adventurous submarine to within striking distance of destroyer, patrol boat or hydroaeroplane, any one of which is "bad medicine" for U-boats.

If convoy has to be resorted to—as may quite possibly be the case—it may not seriously decrease the tonnage transported. Groups of vessels under the protection of war ships are notoriously slow, for the simple reason that the group can move no faster than its slowest member. It will probably be quite possible, however, to so organize the movement of coal that vessels of approximately the same speed may be grouped together. Thus all the vessels in one convoy would move with about their normal rapidity.

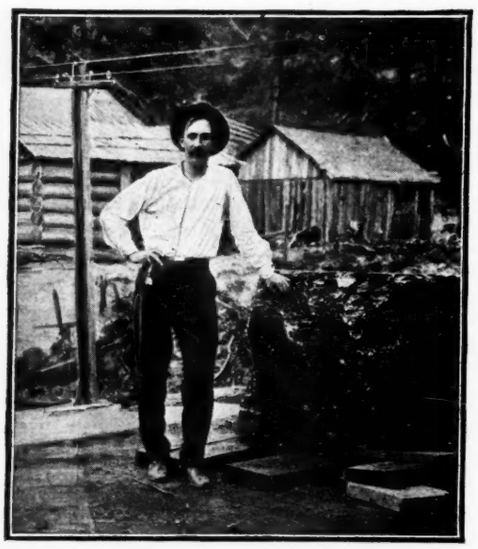
An old adage has it that "forewarned is forearmed." We have lost a few ships at our very doors, we will doubtless lose more. In the meantime, however, means of protecting our coastwise shipping may have to be employed. The Hun U-boat should be no more difficult to hunt in American waters than in the North Sea or the Mediterranean. On the other hand, the submarine enemy is much farther from his base of supplies on this side of the Atlantic than on the other.

While the submarines are sinking a few unarmed schooners, tankers and the like, American shipyards are turning out vessels—real cargo carriers and war ships—at a speed never before equaled in the history of the world. Simultaneously, while the Hun puts dents in the Allied line—dents as expensive in men as they are useless strategically—the war cloud of Germany's new enemy grows even more formidable and threatening. The lightning from that cloud—that our enemies not so very long ago were wont to consider negligible—has already struck—at Cantigny.

Yet a little longer, and in spite of U-boats, massed offensives, frightfulness, "efficiency" and "kultur," we shall see the beginning of the end.

Hungarian Miner Invests All His Savings in Liberty Bonds

THE STORY OF JOHN DZUBER OF BLACKWOOD VIRGINIA



WHO BOUGHT LIBERTY BONDS TO THE VALUE OF $1200

JOHN DZUBER is 27 years old and has been 8 years in this country. He came from Hungary, but I don't believe he should be called a Hungarian any more. He married here some years ago, when he was working in the anthracite region. His child was born here and all the possessions he has were obtained here.

He is not sufficiently Americanized as yet, but he is going to be. He is learning every day and will get there sometime. John saved his money and was wise enough to know that he should keep his money in the bank, but when war was declared against Germany he was afraid to trust the bank and took out his money and put it in his trouser pocket.

Then came the Liberty Loan Campaign. John talked the matter over with the other miners and attended meetings, and he soon saw it was his duty as a citizen to help the boys "over there" to win the war.

He talked things over with his wife and Mr. Creveling, general manager of the Blackwood Coal and Coke Co., and finally bought $1000 worth of bonds for himself and $200 for his wife.

John Dzuber is some American, and there are a number of Hungarians like him in America.

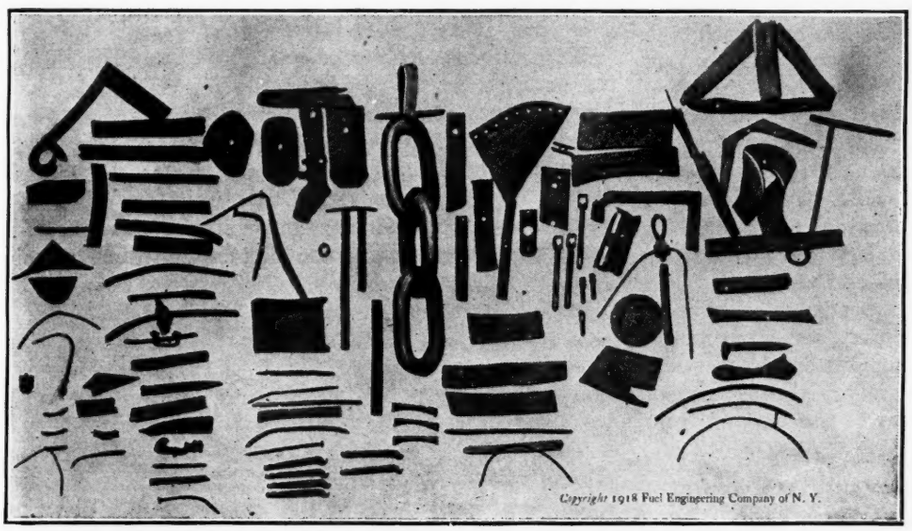
Contributed by Ernest L. Mandel, editor Magyar Munkaslap (Hungarian Workmen's Journal).

DISCUSSION BY READERS

Loading and Shipping Clean Coal

Letter No. 9—Speaking of the frequent recent shipments of impure coal, to which attention has been called by numerous letters appearing in Coal Age, I want to cite an extraordinary case that has just come to my notice in the reading of *Fecony*, an interesting monthly publication of the Fuel Engineering Co. of New York.

The accompanying figure is a reproduction of the supplement of the June issue of *Fecony*, which we are kindly permitted to make. It represents a lot of material that was found in one two-horse truck load of coal, recently delivered to the steam plant of the Society of Useful Manufactures, having a central power station at Paterson, N. J. The truck was loaded from a car of bituminous coal that was shipped from Meyersdale, Penn. The scale of the photo is about 1 in. per ft. The over-all length of the exhibit, as photographed, being 5 ft.



SCRAP FOUND IN A 2-HORSE TRUCK LOAD OF BITUMINOUS COAL

The remarkable feature of this incident is the fact that so much scrap, including both bits of iron, wood, wire rope and cable employed in the operation of a mine, could find its way, either by accident, carelessness, or actual intent, into a car of coal loaded for shipment.

Such a thing seems incredible and, but for the evidence in the photo produced and copyrighted by the Fuel Engineering Co. of New York, it would be unbelievable. Through the agency of its little publication, *Fecony*, and the numerous sources of information open to it through the avenues of its business, the Fuel Engineering Co. have done much toward exposing the dishonest practices and unwise and unjust proceedings that have developed in the coal industry since this country entered the war.

The coal mines of this country, by the fortunes of war, are made the world's storehouse from which must come the fuel needed in the production and transportation of all war munitions and supplies. The output of coal must be maintained at its maximum efficiency.

——, N. Y. A SUFFERER.

Transportation of Coal by Canal

Letter No. 2—My attention has been called to the letter of W. G. Wilkins, which appeared in *Coal Age*, May 18, p. 938, asking for further explanation of the figures presented in my article regarding the practicability of utilizing the canal system of New York State for the transportation of coal.

Mr. Wilkins suggests that in any computation as to the cost per ton-mile of canal transportation, the expenditures made for canal construction, maintenance and repair, the maintenance and operation of the locks and dams and the sinking fund and bond interest charges should be included, and inquires whether the two mills per ton-mile rate, mentioned in my article was based on all of these charges.

In discussing the ability of the improved canals to transport a considerable volume of the anthracite and bituminous coal consumed in the area traversed by the canal between the Buffalo and the Hudson River, I made no computation as to the exact cost of transportation per ton-mile. In fact, there is no accurate basis that could be employed in obtaining such cost. This is because no one has as yet had experience in navigating the new canal, nor has the transportation of commodities on a large scale been undertaken until this year. The actual cost may not be correctly ascertained until the transportation business has been developed.

It was generally understood, however, that the ton-mile cost on the old canal was about two mills. In 1899, the Canal Advisory Committee, of which General Francis V. Greene was chairman, estimated that the cost of transportation, at that date, was 1.75 mills, per ton-mile. The committee estimated also that the cost of transportation on the new canals would be decreased to 0.52 of a mill-ton-mile.

Taking the ton-mile cost on the old canal, as computed by the Greene Advisory Committee (1.75 mills) and considering that the old type canal boats, now being

used on the enlarged canal, may be loaded to a greater draft and carry larger cargoes than was possible when the estimate was made, and further considering that such boats may now move at a greater rate of speed in the larger waterways and make a greater number of trips each season, it would appear that my previous statement that "coal may be profitably transported in large volume via the canal, at a rate of two mills per ton-mile" is susceptible of proof. When, later in the season, business on the canal has developed considerably, figures showing the cost of operation will be compiled and the actual cost, per ton-mile, ascertained.

If the canal system was constructed, owned and operated by a private corporation, undoubtedly, in computing the ton-mile transportation cost, all of the elements mentioned by Mr. Wilkins would be included. In great public improvements undertaken by governments, however, such course has not been followed. Governments enter upon great undertakings for the benefit, direct or indirect, of their citizens, and actual financial returns coming directly to the government are not expected. This is in line with the theory that the general good to be obtained will compensate the nation or state for the actual money expended.

So far as the New York canals are concerned, the securing of a direct revenue by the state is forbidden by constitutional provision, tolls having been abolished about 1881. It is interesting to note, however, that up to the time the tolls were abolished, the state had received a revenue from its canals of approximately $40,000,000, over and above all sums expended up to that time, for construction, maintenance and operation. In addition to this great revenue, it was a fact worthy of note that the canal was the greatest single factor in the growth of the state in both population and commerce. It is fair to assume that, even with the collection of tolls forbidden, as provided by the constitution, the indirect return from the enlarged canal system will continue to be equally as great as was derived from the operation of the old canals.

Canal System of the State Compared with Other Public Utilities

The state maintains a splendid system of state highways, which enables the farmer to bring his products to market cheaply and conveniently. Commodities are transported speedily, from place to place, by trucks. This easy means of transportation has a considerable bearing upon the cost of such commodities to the consumer; and yet, in the computing of the cost to the consumer, it is not the practice to compute also the proportion of taxes paid for highway construction and maintenance to meet sinking-fund contributions and bond-interest charges.

Further, as I understand the policy adopted by the United States Post Office Department, in computing the cost of the postal service, the expenditures for plant, namely, the post-office buildings, are not included. Yet, it is evident that such cost must be met by the taxpayers. To apply the suggestion of Mr. Wilkins, further, in additon to the cost of the stamp required to carry a letter to its destination, we should add the writer's proportion of taxes.

However, as to the canals, their mere existence tends to hold in check and maintain a uniformity of rail rates in the territory between Chicago and New York City. The potential canal competition on the rail-rate structure has an effect that it is impossible to measure in dollars and cents, and every student of transportation knows that, but for the existence of the canals, the rail rates betwen Chicago and New York and the rates made with relation to the Chicago-New York route would be materially higher. In fact, every rate in New York State is affected; and, for every day the improved canal is in operation, the citizens of this state are saving, either directly or indirectly, a large sum in transportation costs. This applies equally also to the merchant, the manufacturer and to the farmer, in the state.

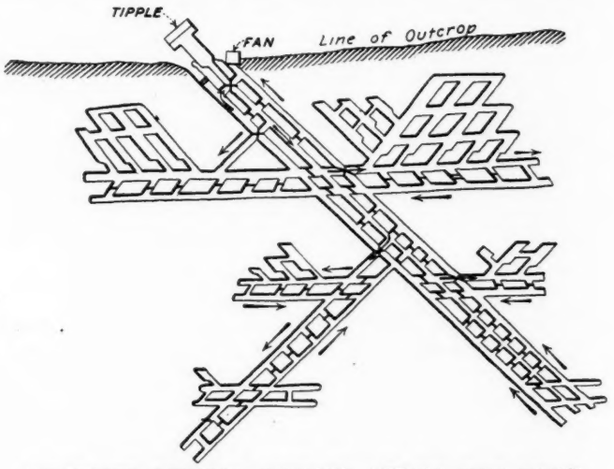
Since it is impossible to reduce the actual figures, the state-wide benefits received from the canal, I am not of the opinion that the construction, maintenance or interest charges should be considered in the computation of ten-mile transportation cost, but the actual boat operating cost alone should be used as the basis.

W. W. Wotherspoon,
Albany, N. Y. Supt. of Public Works.

Working 10-Ft. Inclined Seam

Letter No. 4—Kindly permit me to offer the following suggestions, in regard to the working of a 10-ft. seam inclined at an angle of 10 or 15 deg. and having a sandy-shale roof and pavement, the surface being practically level and traversed by numerous streams, as described in the inquiry, *Coal Age*, Mar. 23, p. 561.

Assuming that the seam dips, at the given inclination, from its outcrop on the surface, if the main slope



PROPOSED METHOD DRIVING ACROSS THE PITCH

is driven at right angles to the outcrop line it would mean that the main haulage road would have a grade varying from 17½ to 26½ per cent., the tangent of 10 deg. being 0.176 and that for 15 deg. 0.267.

In order to avoid this steep grade, I would suggest driving the main slope and air-courses at a suitable angle across the pitch, as indicated in the accompanying figure. The cross-entries can then be driven to the right and left of the main road, on the strike of the seam. As shown in the figure, the rooms are then driven to the rise of the cross-entries and at such an angle as to enable the loaded cars to be handled readily from the faces of the rooms to the gangway.

Taking the dip of the seam as 10 deg. from the horizontal, and driving the main slope at an angle of 30 deg. with the strike of the seam, will give a grade of 100 × tan. 10 deg. × sin. 30 deg. = 100 × 0.176 × 0.5 = 8.8 per cent. This arrangement of entries and rooms driven across the pitch will greatly reduce the difficulty in the handling of the cars and facilitate haulage.

There is one consideration that must not be overlooked in the development of this seam. It may be assumed from the fact that the surface is practically level and the seam has the inclination mentioned, it is practically impossible to open the mine from a point that will afford natural drainage. Had it been possible to do this, such a plan should have been adopted instead of driving a slope to the dip, which makes it necessary to provide means for drainage by pumping.

A careful study must be made of the topography of the country, in order to avoid the endless annoyance, cost, delay and possible disaster that will surely follow the extraction of the coal in this seam, without due regard is had to the streams that may find their way into the mine through cracks and crevices extending to the surface.

In the development of the underground workings, entries should not be driven under the streams, except where it is absolutely necessary, and such openings must be supported by masonry or a tried system of timbering, wherever they pass under these waterways. No room or pillar work should be permitted under or in close proximity to a surface stream.

An accurate map should be made showing all the surface features and the workings below. A "dead line" should be drawn on the map showing the nearest permitted approach of the rooms to the surface streams. In determining this dead line, the high-water mark of the stream should be considered and care taken to avoid any natural crevices in the strata that would permit the inflow of water into the mine.

Assuming that the main haulage slope is driven across the pitch, at such an angle as to give an 8.8 per cent. grade, it will reach a depth of nearly 200 ft., about 2000 ft. from the opening. At this depth, less trouble and expense would be experienced in the extraction of the coal. But, a roof of the character described will always prove an important factor in the safe and economical mining of the coal.

Thomas, W. Va. W. H. NOONE.

Strong vs. Weak Stoppings

Letter No. 1—Permit me to offer a few comments on the question of the advisability of building permanent or resistible stoppings, in contrast to the so-called "resistless or destructible stoppings" suggested by the discussion reported in *Coal Age*, Apr. 6, p. 628. The point of interest is to determine what effect each of these two types of stoppings would have upon an explosion that occurred in a mine. This subject has often been discussed but no definite conclusion has yet been reached.

Each type of stopping has its champions and it is true that each possesses certain advantages; but, so far, I have been unable to form any idea of what might be considered a resistible stopping or one that would successfully resist the force of a mine explosion. It is true that many stoppings have remained intact through violent mine explosions; but this, no doubt, was due to the fact that adjacent stoppings of lighter and weaker construction yielded to the pressure, which was then equalized on both sides of the stouter stoppings.

As a matter of fact, the data available on the maximum pressure attained in mine explosions is very limited indeed, since this depends on the intensity of the explosion, which in turn depends on numerous other conditions, including the resistibility of the mine stoppings.

PROPAGATION OF AN EXPLOSIVE WAVE

When we consider that an explosive wave travels in every direction from its point of origin and that the intensity of the blast and the distance it is propagated depends on the amount of fuel, in the form of inflammable gas or dust, available for the support of the flame, and the amount of oxygen in the ventilating current available for its combustion, it would seem that neither type of stopping as at present constructed and adapted, would have any effect to arrest the progress of an explosion; except only that the lighter stoppings, by yielding, would allow a more ready expansion of the heated gases and thereby reduce the destructive force of the blast, to that extent.

Realizing that coal dust is the principal factor in the propagation of mine explosions, I believe that, by a modification of our stoppings, overcasts and methods of working, and a restricted use of both types of stoppings, together with the adoption of explosion barriers, in the form of wet areas, and the use of stone or rock dust as hereinafter described, mine explosions can be entirely localized so as to produce no effect whatever on other sections of the mine.

PROPOSED METHOD OF BUILDING STOPPINGS

Let me commence with the main headings and suggest building good permanent stoppings of concrete, say not less than 12 in. thick and intrenched at least 6 in. in the coal at the sides. Then, at intervals of 400 ft. or thereabouts, build a self-readjusting collapsible stopping. This may be done by swinging vertically from strong top hinges an iron or steel door, which should be hung between good concrete sidewalls and be free to swing in either direction. Overcasts, likewise, should be built with self-readjusting doors in the bottom sidewalls. A little cement or clay may be used to seal them under normal conditions.

Arriving, now, at the room entries, no rooms or working places should be turned off these entries, for a distance of 300 ft. This space should be maintained as an explosion barrier and must be kept thoroughly wet, at all times, shelves of stone or rock dust must be suitably arranged herein. The same applies to all roads, headings and air-courses that may lead into this section. It is not necessary, however, to leave a solid pillar of coal, here, 300 ft. thick; as No. 1 room can be utilized as a heading to turn rooms back toward the main or branch heading, as the case may be. These rooms, however, should not be allowed to cut through

or intersect the main or branch heading, unless it be the last one, which is sometimes essential in gaseous mines to successfully ventilate the panel or workings during or after the process of pillaring. In that case, this last room should also be an explosion barrier and treated accordingly.

On all room headings, I would suggest building nothing but light destructible stoppings that would immediately yield to the explosive force, thus allowing it to spend itself by expanding as much as possible, before coming in contact with the barriers, and thereby reducing to a minimum any chance of flame passing beyond the area where it started. The self-readjusting stoppings and overcasts will probably take care of any excess pressure that would find vent on the main or branch headings, and the force of the explosion will generally dissipate itself in the section where it originated, without doing any material damage to the ventilating system in other portions of the mine.

From what has already been said we can see that to successfully confine or limit explosions, some panel or sectional system of working the mine must be adopted; but this should not prevent ventilating two panels or sections with a single air-split, providing the connection between the two sections was long enough to form an explosion barrier; and providing, also, that this connecting passage contain one or two iron or steel doors suspended in such a manner that they would automatically drop by the force of an explosion and form stoppings that would prevent the inrush of afterdamp into the unaffected workings—thus allowing the workmen time to retreat to the main heading until the ventilation has been rearranged. I advise, however, that where possible each panel or section be arranged large enough to warrant a separate air-split and, incidentally, to assure some financial return for the additional expense incurred by these safety features.

It is very apparent that no matter what happens, the work of rescue after an explosion would be greatly facilitated by such a system of ventilation, as the air current could be restored in a much shorter period than is possible by the present system. The plan should certainly commend itself to our consideration when we remember the large toll of life that afterdamp has been responsible for in past explosions. E. P. BRENNAN.

Thomas, W. Va.

Safety in Shotfiring in Mines

Letter No. 5—It is true, as suggested by R. J. Pickett, *Coal Age*, Apr. 20, p. 754, that we have in our mines both the "enemy alien" and the "German sympathizer," and for this reason it is of the utmost importance that the work of handling explosives be safeguarded in every manner possible.

My opinion is that the employment of shotfirers, in all mines, is the only guarantee of safety at this time, and these must be men who are fully qualified for the position. Their duty should be not only to inspect and fire all holes, but they should charge, tamp and fire every shot themselves. No one but an authorized shotfirer should be permitted to handle the explosives.

We have but to consider, for a moment, the danger to a shotfirer when miners are permitted to charge and tamp their own holes. A miner so disposed could overcharge his hole to a dangerous extent, and this would not be known to the shotfierer, who might be killed by the blast. The overcharge might cause a blownout shot followed by a dust explosion that might wreck the mine and cause the loss of many lives.

Observation shows that the majority of our coal companies are too slack in their regulations regarding the use of explosives. In the majority of cases, the miner draws his powder check or dynamite check from the office, takes it to the magazine, and is given a full keg of powder or as much dynamite as he wishes, which he takes with him into the mine to use in his own way.

Reason should convince any man that this is not a safe manner of handling the work of blasting coal in mines. There should be an absolute check on the amount of explosives taken into the mine each shift, and this amount should not exceed what is required to perform the work in that shift. The number of shots to be fired should be reported when the miners quit work for the day. This will enable the shotfirer to determine the amount of explosives required for his work.

INDIFFERENT WORK OF SHOTFIRERS IN PLACES

While shotfirers are employed in the mine where I am working, the miners charge and tamp their own shots, and each miner splits his fuse so as to expedite the work of firing the shots. The shotfirer goes from place to place as rapidly as possible, and takes no time to look for danger. Although every shotfirer is fully qualified and should inspect each place for gas before firing a shot therein, this is not often done.

The mining laws of Kentucky and many other states require the shotfirer, upon completing his work each shift, to post a notice in a conspicuous place, showing the number of shots fired and the number not fired, specifying the number of the room and entry where such shots were located and giving their reasons for not firing them.

Each shotfirer must also make a daily record, in a book kept for that purpose, showing the number of shots fired, the number failing to explode, and the number of blownout shots, besides the number of holes that, in their judgment, were not properly prepared. This is an important provision and should be made a part of all mining laws.

It is my opinion that if the work of blasting were made to conform with the requirements of the mining laws, in the several states, there would result a great reduction in accidents from this cause. I believe that the firing of shots in mines has an important bearing on the conservation of life, which is so necessary for the winning of the war. OSCAR JONES.

Worley, Ky.

What's Wrong with the Mines?

Letter No. 1—The editorial that appeared in *Coal Age*, Apr. 20, p. 752, asking what is wrong with the mines that there should be an increase of 21 per cent. in the fatalities reported for the year 1917, as compared with those of previous years, set me to thinking and wondering as to the actual underlying cause for this large increase in the number of mine accidents.

While the dangers attending the mining of coal are quite well known to every mining man, in a more or less general way, I have noticed that there is a tendency with many mining men to treat with almost absolute contempt the greatest dangers. This must arise, I believe, from an ignorance of the real significance of such dangers.

A large majority of accidents can only be avoided by the constant watchfulness and mutual coöperation of every person employed in and around the mines. As a chain is no stronger than its weakest link, so likewise a mine is no safer than the acts of the most careless worker therein would determine.

All coal-mining states have laws regulating the operation of their mines with respect to safety, prescribing what should be done to avoid accidents and prohibiting practices that are considered unsafe. If these laws were strictly enforced by the persons charged with that duty, and if mine workers would coöperate to that extent, there would be a great reduction in the number of accidents that occur each year in the mines.

A word about the timbering of working places: Most state laws provide for some form of systematic timbering at the working face, and it is the duty of every miner to set the timbers as quickly as the required distance is reached. Instead of this, however, the average miner is prone to start first loading his coal, intending to set the needed timbers as soon as this work is finished.

When a mine official, entering a man's place, finds him loading coal and the timbers not set, it is plainly his duty to insist on the work of timbering being done without further delay. He should remain and see that his orders are obeyed. The man should then be warned, and, if found guilty of a second offense, he should be prosecuted.

If this was done, men would soon come to realize that it would be better for them, to obey the law. The leniency of mine officials, in this respect, goes far toward increasing the accident list, as miners are not slow to take advantage of this leniency and defer the setting of timber until their coal is loaded and the place cleaned up ready for a new start.

Accidents That Should Be Avoided

Frequent accidents occur on haulage roads, due to drivers failing to sprag their cars, instead, bracing their backs against the front of the car in an attempt to hold it back from the mule when a single slip of the man's footing may cause his death or serious injury. Tripriders take many chances jumping on and off fast-moving trips, and miners violate the mine rules by riding loaded trips and discarding the traveling road that has been provided solely for their safety. Doors on main haulage roads, bad tracks, and cars left standing on the tracks are the causes of many avoidable accidents in haulage. These all show bad management on the part of mine officials and lack of coöperation on the part of employees.

Regarding the most serious accidents, due to explosions of gas and dust, three elements are to be considered: (1) Accumulation of gas; (2) accumulation of dust; (3) means of ignition of the gas or dust. Let me say that the accumulation of gas must be avoided by an ample ventilating current conducted so as to sweep all working faces and void places in the mine. The accumulation of dust is more difficult to prevent; but the evil may be greatly reduced by loading out all fine coal and the "bug dust" produced in machine mining, and by enforcing strict regulations in regard to the blasting of the coal. All roads and other passageways should be cleaned regularly and watered as may be required to lay the dust and prevent its suspension in the air current.

The use of steam jets on the intake to moisten the air current, and different devices for spraying the cars of coal as they pass out of the mine only partially eliminate the danger from the presence of dust. Rock-dust zones and barriers suspended from the roof in entries serve only to arrest an explosion when one is started. Any system of watering to lessen the dust danger effectively must moisten the dust with, at least, 50 per cent. of its weight of water, as determined by the Belgian Royal Commission on the inflammability of coal dust.

Calcium-Chloride Treatment of Dust

Some years ago I witnessed the experiment of sprinkling, by hand, finely powdered calcium chloride on the walls, roof and floor of a haulage road 1500 ft. in length, in a mine in Lancashire, England. One application was good for three weeks and had the effect of extracting sufficient moisture from the air to make the fine dust so that it could be molded in the hand, and was caked on the floor where men were walking to and fro.

About 1 lb. of calcium chloride was used for every 60 sq.ft. of surface. It was thought that the amount of moisture the calcium chloride extracted from the air, however, was a drawback to the rest of the mine. In my opinion, a mixture of one part of calcium chloride to two parts of rock salt ground to a fine powder is most effective for neutralizing the coal-dust danger, while a plentiful supply of water thoroughly mixed with the dust is next.

Finally, to eliminate the many causes of ignition of gas and dust, allow me to suggest the exclusive use of electric head lamps. Also, no one should be permitted to carry a safety lamp except a duly authorized mine official. Every man entering the mine should be carefully searched for tobacco, pipes and matches. All shots should be fired by competent shotfirers, after the men have left the mine, and only permissible explosives should be used.

Men should not be allowed to work in a place where the lamp shows more than a ¼-in. gas cap. Chemical fire extinguishers should be kept at all shaft and slope bottoms and in pump rooms and other places where they may be needed. A trained fire-fighting force should always be available and telephone connection with the surface should be maintained throughout the mine. Fire drills should be carried out regularly once a month.

In conclusion, I would say that the most that is wrong in the mines of today is their lack of system in mine management and the lack of coöperation of mine workers.

Cumberland, B. C., Canada. James Touhey.

INQUIRIES OF GENERAL INTEREST

The Law on Ventilation

In the discussion of matters of general interest in mining, at our regular weekly safety meetings, important questions have often arisen that we have been unable to thrash out. Two of these that were discussed recently pertain to provisions of the bituminous mine law of Pennsylvania relating to ventilation, and we would be glad to see them discussed by readers of *Coal Age*. They are as follows:

1. In Art. 9, sec. 3, the law specifies that the distance between crosscuts in room pillars shall not be more than 35 yd. nor less than 16 yd.; but nothing is said, in that section, in regard to the distance between crosscuts in entry pillars. However, in Art. 6, sec. 4, relating to intake and return entries, the law specifies that said entries "shall not be driven more than 200 ft. beyond the last cut-through, except for exploratory purposes."

The meaning of the law, as would appear from these two references, seems to be that crosscuts in entry pillars can be 200 ft. apart, while those in room pillars cannot exceed 35 yd. or 105 ft. It is needless to say that some good mining men dispute this interpretation of the law, and we shall be interested in hearing what *Coal Age* readers think.

2. The first two sections of Art. 9 specify clearly the amount of air required by law to be circulated in the mine, for each person employed therein; also, the number of men permitted to work on a single split of air. The law reads (sec. 1), in part, as follows:

> The return air, from each split where from 70 to 90 persons are employed, shall be conducted by an overcast or an undercast into the return airway, which shall lead to the main outlet. The ventilation shall be conducted through the main entries and cross-entries to the working faces of all working places in the mine, in sufficient quantity to dilute, carry off and render harmless the smoke and the noxious and dangerous gases generated therein, to such an extent that all working places and traveling roads shall be in a safe and healthy condition for the persons working and traveling therein.

The question has arisen, What, in the meaning of the law, constitutes a return airway, and what are the limitations that require an air current charged with noxious gases to be conducted directly into the return airway leading out of the mine?

To illustrate, suppose there are two pairs of entries, working rooms and ventilated by the same air current, and the first pair, on this split, reports gas in dangerous quantity. Does that circumstance make the rest of the split circulating through the second pair of entries "return air" in the meaning of the law?

Or, again, suppose the air current passes over a gob section generating noxious gases, the said section lying between two live entries, all being ventilated by the same air-split; would this current become "return air," immediately after passing over or through the gob section, and would it be practical to work the rooms on the return side of such a gob section?

Believing that the practical discussion of these questions will be of value to every mining man, they are submitted to *Coal Age*, hoping for their publication.

CHARLES MARTIN, Superintendent,
Smokeless, Penn. Conemaugh Smokeless Coal Co.

Replying to the first question asked by this correspondent, it may be stated that, while the Pennsylvania Bituminous Mine Law permits entries, in the mines of that region, to be driven 200 ft. ahead of the last crosscut, it is not customary to do this, except where special appliances are employed to conduct the air current forward to the face of each heading.

In some cases, where the mine is generating no gas, advantage is taken of this feature of the mine law to reduce the expense for driving crosscuts. In such cases, however, use is made of flexoid tubing, or a canvas brattice is erected in the headings to conduct the air forward to the face.

Regarding the second question, the law clearly specifies that the ventilation shall be conducted to each working face in such a manner that the place shall be safe and healthy for work. This provision would make it unlawful to work men where the air current was charged with gas to a dangerous extent or where the place was unhealthy by reason of being located on the return side of a gob section. The arrangement suggested by correspondent would often limit the number of men employed on a single air-split to less than the 70 persons ordinarily allowed. We hope to hear from others on these important questions.

Track Switch Calculations

Kindly explain the meaning of the "frog number," in mine trackwork, and show how to calculate the length of the "lead rail" of a switch. FOREMAN.
———, W. Va.

In all trackwork, frogs are numbered 1, 2, 3, etc., corresponding to the ratio of the length of the frog rails to their spread. Thus, a No. 4 frog has a spread of 1 ft. in 4 ft. The calculation of the length of the lead rail of a switch is based on the number of frog used and the gage of the track.

Assuming a 3-ft. track gage and a No. 4 frog, the length (l) of lead rail, in feet, required is found by multiplying twice the track gage (g), in feet, by the frog number (n), which gives, in this case:

$$l = 2gn = 2 \times 3 \times 4 = 24 \text{ ft.}$$

The radius of curvature (R), in feet, is then found by multiplying the length of lead rail by the frog number;

$$R = nl = 4 \times 24 = 96 \text{ ft.}$$

These formulas and rules have been fully explained sometime since, in *Coal Age*, Vol. 10, p. 653.

EXAMINATION QUESTIONS

Miscellaneous Questions

(Answered by Request)

Ques.—If 31,983 cu.ft. of air and marsh gas was passing through a section of the mine where the lamp flame indicates that the mixture is at the highest explosive point, what is the quantity of gas given off?

Ans.—A mixture of pure marsh gas and air, at its most explosive point, contains 9.46 per cent. of gas. The volume of gas, in this case therefore, is 31,983 × 0.0946 = 3025 cu.ft. per min.

Ques.—What quantity of air will pass in each of the three following splits: A, 6 x 6 ft., 1000 ft. long; B, 6 x 5 ft., 2000 ft. long; C, 6 x 4 ft., 3000 ft. long; the original airway being 6 x 5 ft., in sectional area, 5000 ft. long, and producing 80,000 cu.ft. of air per min., the pressure being constant?

Ans.—This question, as it reads, appears to be wholly unintelligible. It is not clear what is meant by the original airway 6 x 5 ft., 5000 ft. long. The combined length of the three splits given is 6000 ft., and each of these airways has a different cross-section. It might be assumed that the question intended to ask, What quantity of air would be circulated in the three splits named, under the same pressure that would circulate 80,000 cu.ft. of air per min. in an airway 6 x 5 ft., 5000 ft. long.

However, the pressure that would produce this circulation in a single airway of the dimensions given is practically 510 lb. per sq.ft., which would give a water gage of 100 in. nearly. The velocity of the air current would be 80,000 ÷ 30 = 2666 ft. per min. It is hardly to be supposed that this can be the meaning, therefore it will be necessary to revise the reading of the question before a solution can be given. Such a question has the appearance of being a catch question.

Ques.—The water in a mine is hauled up a shaft 400 yd. deep, in two tanks each holding 400 gal., the one ascending and the other descending. What horsepower is the engine developing when delivering a tank of water every 3 min. at the surface, not including the time lost in emptying and filling the tanks?

Ans.—The depth of this shaft is 400 × 3 = 1200 ft. Assuming that the tanks balance each other and that the weight of the rope acting alternately to increase and decrease the load on the engine may be ignored, and taking the time of making each hoist as 3 min., the effective horsepower of the engine, disregarding friction, is

$$H = \frac{400 \times 8\frac{1}{3} \times 1200}{3 \times 33{,}000} = 40.4\ hp.$$

Ques.—In a certain shaft the cage weighs 2½ tons, empty car, ¾ tons, loaded car, 2½ tons, rope, 2 tons; what should be the small diameter of a conical drum whose large diameter is 28 ft., in order to equalize the load on the engine?

Ans.—In this case, the weight of the cage and car is $W_c = 2\frac{1}{2} + \frac{3}{4} = 3\frac{1}{4}$; weight of material hoisted, $W_m = 2\frac{1}{2} - \frac{3}{4} = 1\frac{3}{4}$; weight of rope, $W_r = 2$ tons. The ratio of the small diameter (d) to the large diameter (D) of a conical drum, in order to equalize the load on the engine, is given by the formula,

$$\frac{d}{D} = \frac{2W_c + W_m}{2(W_c + W_r) + W_m}$$

Then, substituting the given values in this formula, we have for the small diameter of the drum, the large diameter being 28 ft.,

$$d = 28\,\frac{2 \times 3\frac{1}{4} + 1\frac{3}{4}}{2(3\frac{1}{4} + 2) + 1\frac{3}{4}} = 18\frac{9}{17}\ ft.,$$ or, say 18 *ft.* 10¼ *in.*

Ques.—What precautions would you suggest to protect workmen while retimbering a shaft for safety?

Ans.—The work of retimbering a shaft should start at the top and proceed downward, in order that the men shall always be working beneath that portion of the shaft that has been made secure with new timbers. On the other hand, if this work were to be started at the bottom and proceed upward, the men would constantly be in danger of loose material falling upon them from the weakened timbers in the shaft that are to be replaced.

Not more than one or two sets of timbers should be removed at one time, and these should be replaced with new timbers before more sets are removed. Only experienced men should be employed in this work, and the utmost care must be taken in supporting the platform on which the men stand while performing the work. Every precaution must be taken to prevent material falling down the shaft while the work is in progress.

Ques.—A borehole A strikes the coal at a depth of 60 yd.; another, B, reaches the same seam at a depth of 70 yd.; and a third, C, at 80 yd. The hole, B, lies 600 yd. north 30 deg. east from A, and the hole, C, 600 yd. south 30 deg. east from D. Find the direction of (a) a level course in the seam; (b) the direction of the dip; (c) the rate of dip in this seam.

Ans.—The lines joining these three holes form the sides of an equilateral triangle, the length of each line being 600 yd. Since the bearing of the line AB is N.30°E, and BC is S.30°E, the line AC is due east. Assuming a level surface, the seam falls 10 yd. from A to B and 10 yd. from B to C. The fall from A to C is 20 yd., and halfway from A to C the seam will have fallen 10 yd. and have the same elevation as at B, or 70 yd. below the surface.

(a) A level course, or the strike of the seam, therefore, is a line drawn from B to halfway between A and C, and its direction is north and south.

(b) The direction of the dip is at right angles to the strike or due east.

(c) The line AC lies in the full dip of the seam and the rate of dip is 20 yd. in 600 yd., or 1 in 30.

COAL AND COKE NEWS

Harrisburg, Penn.

Seward E. Button, chief of the Department of Mines, has called attention of the United States authorities to the conditions brought about in the coal regions of Pennsylvania by drafting of miners at a time when there is a call for the greatest possible production. He has requested that some arrangement be made which will permit more miners to remain at work.

A statement issued by Mr. Button says that he is "very much concerned over the acute conditions that exist at present in the great mining regions of the Commonwealth owing to the imperative demands of the Federal Government for a maximum production of coal in the face of a constantly decreasing force of mine workers whose ranks are being seriously depleted by the drafting of men into the army." Undoubtedly the present demands upon the operators are the most exacting ever known, but it is the universal desire of the mine owners to give to the Government the greatest aid and support. The desire of the operators, however, is made impossible of fulfillment by reason of the shortage of employees. There has been a constant drain upon certain classes of employees, particularly drivers, runners and electricians, and the result has been to reduce greatly the force necessary to produce the best results in mining coal.

The Public Service Commission on May 27 issued an order on the New York Central Lines to make reparation to the New York and Pennsylvania Co., Lock Haven, of $9245.29, as rebate for overcharges for movement of coal from Munson and Hawk River districts to Bald Eagle Junction. The order is the result of litigation before the commission in which it was claimed that the charges were too high. The sum covers claims in the year ending Aug. 24, last.

Culm piles, though they have been classed as personal property, do not present a case of an ordinary chattel, says Judge Strauss (Luzerne) in his opinion continuing the preliminary injunction brought by C. P. Holden against George J. Llewellyn and Frank Carlucci, restraining the latter from carrying off a culm pile in Pittston township containing between 160,000 and 190,000 tons of coal.

This suit was rather complicated as both plaintiff and defendant claimed title to the property and actual possession, and while the plaintiff produced proofs that he acquired the coal in the pile, subject to royalties, the defendants held that an injunction did not apply and that the plaintiff should have recourse to the law courts.

Fairmont, W. Va.

West Virginia coal men are so well pleased with the proceedings at the annual meeting of the National Coal Association that there is little doubt that the first meeting of the executive committee of the West Virginia Coal Association, the state organization, will be harmonious and highly profitable. The meeting was originally set for June 1, but owing to the meeting of the National Coal Association, the holiday which followed and other matters, the meeting at Huntington was postponed until June 21. The various local associations have elected their representative on the executive board and it now remains for the board to get together and outline a policy. It was at first intended to have the associations vote as units in the state organization, but this may be changed in accordance with the action of the National Coal Association giving each corporation belonging to the local coal associations a vote in the state body as they now have in the national body. W. H. Cunningham, of Huntington, who still retains the secretaryship of the association under the old organization, has announced that the postponed meeting will consider war work as well as actual coal matters.

There were 184 candidates at the recent mine examination held in Fairmont, and the class of men aspiring to be mine foremen, firebosses, etc., was commented upon by W. J. Heatherman, the new mine inspector for West Virginia, and the district mine inspectors, who were here. The interest in the examination was high and the class was the largest yet reported excepting that at Charleston, where there were 230 entries.

The work of organization of the coal miners in the Fairmont district is moving along rapidly. The contract agreement plan of the Consolidation has not proved very successful, and in most places the organization perfected is that of the United Mine Workers. "Mother" Jones is in the region and is making speeches at various points. There are six or eight other organizers in the field. There has been nothing said which could be objected to by operators as far as is known.

Birmingham, Ala.

That the campaign launched some weeks ago to increase production at mines has not been in vain is shown by the greatly improved conditions noted in every section. Coal production for the week shows a most favorable improvement over the output of the last few weeks. However, in some localities it is still maintained that with the labor available the output should have been on a larger scale than that recorded.

Extreme effort is being made to bring labor in the mining district up to a full realization of the absolute need of a maximum production of coal. A special plea has been addressed to the coal miners of this district by the Alabama Fuel Board to give every day possible to mining, and the request is meeting with almost general response.

A movement is on foot to educate the miner to the comforts of life in providing better homes and a means to spend money. It is hoped that through this medium the miners will feel the desire to earn more and will not cease operations, or lag in their work, as soon as their immediate needs have been satisfied.

Backing this effort is the attempt to arouse the patriotic spirit of the men. Speakers from the war-stricken countries are making tours of the mining sections and are telling the employees that every day given to the work of coal production means that much toward winning the war.

Charleston, W. Va.

For the week ending May 25 an increase in the production of coal was achieved in the Kanawha district amounting to about 16,000 tons, the production figures for the week ending May 18 being 137,852 and for the week ending May 25 154,634. The 154,634 tons were produced during 3862 working hours. Owing to car shortage 825 hours were lost, the loss in time owing to labor shortage being only 245 hours, to a strike 40 hours, to mine disability 479 hours. Failure of the power companies in this section to furnish an adequate supply of power was principally responsible for the loss of time included in mine disability, although a wreck caused a half-day's loss. Up to May 28 a total of 31,807 cars were loaded out of the Kanawha district, as against 31,638 empties received. The car quota for the Kanawha district has been reduced in terms of tons to the amount of 1820 tons per week and in the New River field by 2300 tons per week.

Reports from Raleigh and New River fields show that the mines have been experiencing a good deal of difficulty in securing power, mines in the Raleigh field or rather in certain parts of the Raleigh field having been shut down on the 27th and 28th because of lack of power. The mines in the New River field were also handicapped by the same cause, and operators in the New River district are almost up in arms, the power failure coming just at a time when conditions were beginning to become satisfactory and conducive to a greater production.

West Virginia fared well at the recent meeting of the National Coal Association. Jere H. Wheelwright, president of the Consolidation Coal Co. was elected president; C. H. Jenkins, president of the Central West Virginia Coal Operators' Association, Quinn Morton, of Charleston, and J. J. Tierney, of McDowell, were named as directors, and the last three, together with R. H. Gross, of the New River Co. with headquarters at Boston, and T. B. Davis, of the Island Creek Coal Co. with headquarters at New York, were elected directors at large.

Attorney-General E. T. England of this state having ruled that women may be employed in work around and outside of West Virginia mines, several mines with headquarters in Huntington are considering the feasibility of employing women at the picking tables, on the tipples and on work of a similar nature.

PENNSYLVANIA

Anthracite

Hazleton—The Dodson Coal Co. has acquired 3300 acres of bituminous coal lands on the Maryland-West Virginia boundary line. The company will develop the holdings at once.

Hauto—The Harwood Coal Co., J. S. Wentz & Co. and the Harleigh-Brookwood Coal Co. are the first in the anthracite field to agree to contribute to the war chest fund in proportion to the amount donated by their men. It is expected that all of the mining corporations will contribute sums equal to the total of their employees.

Duryea—The patriotic spirit was ablaze on May 30 among the workers at the William A colliery of the Lehigh Valley Coal Co. The occasion was the raising of two flags on a fine new steel flagpole 75 ft. in height, which was erected during the week in the center of a grass plot in the colliery yard. One of the flags was an American banner purchased by the employees of the colliery, the other being a Liberty Loan honor flag, presented to the colliery by the Old Forge bank, in recognition of the colliery having achieved a 100 per cent. record in subscriptions to the third Liberty Loan.

Freeland—Charging that the defendant company is about to remove $2000 worth of steel rails from an abandoned mine without authority or right, Charles H. Hemsath has brought a suit in equity against the Harleigh-Brookwood Coal Co. and W. G. Thomas, and has been granted a preliminary injunction by the court. The Hemsath heirs contended that at the time the coal company abandoned the property the leasing company was in arrears about $1500 in royalties and wants this amount from the company before the rails can be taken away.

Barry—The first electric washery ever installed in this state, which will enable six men to recover 500 tons of fuel a day, will be put in operation about June 15, by the Schuylkill Coal Co. The coal company has leased the riparian rights along the Mahanoy Creek for a distance of four miles for a period of 20 years. It is estimated there are 3,000,000 tons of steam and domestic sizes in the tract. On the property in question the company has dredged down 14 ft. without running through the deposit. Decision to utilize electric power for the operation of the washery grew out of the costly experience suffered by steam washeries in the loss of boilers through the heavy percentage of lime and sulphur in the water. The saving in labor (the project requiring only six men) compared with 12 or 14 with steam plants, was also a factor. Power for the washery will be furnished by the Eastern Pennsylvania Railways Co., at Pottsville.

Plymouth—The fire that broke out in the Red Ash vein of Nottingham No. 15 colliery, Lehigh & Wilkes-Barre Coal Co., early in April continues to burn notwithstanding the heroic effort of officials and company hands to extinguish it. During the weeks it has existed much good work has been accomplished, however, and it is now thought the worst is past and in a brief space of time it will be surrounded and quenched which when done will enable the company to increase the output of this famous old mine, one of the largest in the hard-coal regions and one where fatalities and serious accidents are a rarity notwithstanding its heavy daily tonnage.

One or two fires exist in other collieries of this company beyond the river, but from last reports all was going well and they also will soon be overcome.

The last mine fire of any consequence in this section was in Buttonwood colliery when operated by the Parrish Coal Co., and that of the Avondale colliery, D. L. & W. R.R. Co. in September, 1904.

Shamokin—In its program to speed up anthracite production the Susquehanna Collieries Co. is replacing veteran foremen with younger men at the same time taking care of the older men. Recent changes made include transfer of David Hughes, foreman at Pennsylvania colliery, to Richards No. 4, Hughes having been succeeded at Pennsylvania by Michael Farrell, foreman at Hickory Ridge. Ray Hughes, a mining engineer, has been made assistant foreman at the Scott colliery.

Pockville—The Mt. Jessup colliery was shut down by William Potter, Federal fuel administrator for Pennsylvania, on June 3, for loading dirty coal. Thirty-nine cars from this operation were condemned last week. F. H. Ford, general manager of the company, has been ordered before Mr. Potter and will be told there must be a change at his plant and that reports must be made to the county administrator daily.

Bituminous

Connellsville—The tipple at the Kyle mine of the H. C. Frick Coke Co. was destroyed by fire, entailing a heavy loss and the temporary shutdown of the mine. The fire is thought to have been caused by a spark from one of the dinkey locomotives.

Perryopolis—The Alfred Fuller estate, consisting of 510 acres of coal land, has been sold to the Jamison Coal and Coke Co., of Greensburg, for a consideration of $1,760,000, or at the rate of $3200 per acre. This price is considered the highest price ever paid for undeveloped coal land in Fayette County. It fronts on the Pittsburgh and Lake Erie R.R. and the Washington Run Railroad.

Pittsburgh—Director John J. McKelvey of the Department of Charities recently was authorized by the Council's finance committee to open and operate a municipal coal mine at May View. An appropriation of $80,000 already has been made by Council for opening a municipal mine. The bill authorizing Director McKelvey to proceed was amended to provide for employment of a mine superintendent at a salary not to exceed $300 per month.

Philadelphia—James M. Orr, of Clarksburg, W. Va., president of the Orr Coal Mining Co. with offices here, was fined $5000 by Judge Dickinson in United States District Court on May 31 for profiteering in coal. The prosecution was the first in this district. Mr. Orr charged a price for bituminous coal higher than that fixed by President Wilson. The coal was billed to customers at the regular price, but by a secret understanding an excess was collected. Mr. Orr plead guilty, and the Government was satisfied with the imposition of a fine.

Uniontown—Mine Inspector Richard Maize, chairman of the board of examiners for the Fifth Bituminous District, has announced the following as having passed a successful examination: Ralph Miller, of Dunbar, and Elmer Mathews, of Mount Braddock, mine foremen; Herbert Pratt, of Connellsville, assistant mine foreman; George W. Landman, of Dunbar, George Foley, Smith R. Matthews, Thomas Callihan and Arthur Whitlock, all of Mount Braddock, firebosses.

The Whyel Coal Co. of this city has sold 27 tracts of coal land in Harrison and Marion Counties, West Virginia, to John Y. Hite, of Fairmont, W. Va., for $585,000.

ALABAMA

Fairfield—The Tennessee Coal, Iron and Railroad Co. will construct an addition to the Koppers byproduct coke ovens at this place, consisting of two additional batteries of 77 ovens each, or a total of 154 ovens, together with complete byproduct recovery plants. The additional ovens are being constructed at this time to secure the toluol, ammonia and benzol, which is needed for the manufacture of ammunition and also to secure a saving of several hundred thousand tons of coal per annum, which will result by substituting coke manufactured by the byproduct oven process for coke which is now being manufactured in beehive ovens

WEST VIRGINIA

Glen White—The E. E. White Coal Co. has decided to erect a $150,000 steel coal tipple, with a daily capacity of 5000 tons.

Downs—The Rachel Gas Coal Co. will resume full working time shortly, having installed new electrical equipment following the recent fire which handicapped the plant for several days.

Eccles—The mines at this place will hereafter be supplied with cars from both the Chesapeake & Ohio and Virginian railways, as was formerly the custom until a misunderstanding of the orders of the regional director shut off the supply from one of the roads.

Clarksburg—Daniel Howard has purchased two mining plants of the Consolidation company, acquiring control of Mines No. 39 and 46 at Two Lick Station. Mr. Howard is one of the leading operators of the Clarksburg field and this purchase increases the magnitude of his holdings, giving added capacity of something like 1000 tons a day.

Clarksburg—For a consideration of $67,500 the Fairmont and Clarksburg Fuel Co.'s mining plant in this county has been purchased by J. H. Henderson, of Connellsville, Penn., according to a deed filed for record recently in the county clerk's office here. The property, which includes traces of the Pittsburgh and Keystone bed of coal, is routed on the West Virginia & Pittsburgh branch of the Baltimore & Ohio R.R. along McKinney's Run.

Weirton—At a cost of approximately $600,000 a byproduct coke plant and 600-ton blast furnace will be erected across from Steubenville at this city. The plant will be erected near the Phillips Sheet and Tin Plate Co.'s works and will be operated under Government supervision. The contract, which has been awarded to a Cleveland concern, calls for the completion of the plant shortly after the beginning of next year. The plant will afford employment for 500 men and is said to be the first of a number of steel plants to be erected in the Steubenville district in the near future.

Morgantown—J. W. Heatherman, Chief of the West Virginia Department of Mines, has announced that he will hold an examination for mine foremen and firebosses at Morgantown on July 26 and 27. When the details of the Short Course in Coal Mining, which is to be given at West Virginia University from June 17 to July 27, were brought to Mr. Heatherman's attention he was enthusiastic in his praise of the work the university is doing for the miners, and said he felt that the men who took the short course should have an immediate opportunity to take the examination for their mine foremen's and firebosses' certificates. Inasmuch as the short course is given without cost to all who are interested, it is a splendid opportunity for those who are preparing for the examinations, or for those who failed at the May and June examinations and desire to make another attempt to secure their certificates. Prof. A. C. Callen, Morgantown, will be glad to hear from any who are planning to take the Short Course in Coal Mining.

Charleston—An agreement between 90 per cent. of the members of the Central West Virginia Coal Operators' Association and the miners' organization of the district has been accepted by the association. By it the miners and operators bind themselves to produce as much coal as possible during the war, and the agreement brings the two organizations into closer alliance. It is believed that the rest of the operators will unanimously stand by the agreement.

Gross negligence is charged against the mine officials and officials of the state department of mines by Coroner P. S. Shirkey in his verdict on the inquest he conducted in the cases of the 13 miners who met their deaths in the recent disaster in the mine of the Mill Creek Cannel Mining Co. The coroner found that the 13 miners who lost their lives came to their deaths from suffocation and holds the mine and department officials equally responsible through negligence in making proper inspection of the mines.

INDIANA

Petersburg—New mines are being opened by the Atlas Co., just north of here. Seven machines will be used in the new mines and employment will be given to a large force, it is announced.

Frankfort—The supply of coal at the municipal light plant was exhausted, and railroad shops, munition plants and other important industries dependent upon this supply of power have been seriously handicapped. Robert Bracken, fuel administrator for Clinton County, asked immediate relief for this plant. It seems that the city plant at Frankfort has been obtaining a special grade of coal from mines at Panama, Ill., and special machinery had been installed to handle this coal. Under the zoning system, which went into effect Apr. 1, Illinois coal could not be supplied this plant and its machinery would not permit the use of Indiana coal. The case has been referred to the national Fuel Administration at Washington.

Evansville—The Gibson-Moore Coal Co. mine, located between Howell and Evansville, has been closed down. It is not expected the mine will be opened again as it is said it could no longer be operated at a profit. The mine is one of the oldest in the city and for many years was operated by Capt. John Ingle.

On May 22 practically all the coal mines along the Evansville & Indianapolis R. R. resumed operation after many of them had been idle for eight weeks. A dispute over freight rates caused the shutdown of the mines, and this dispute was settled recently by the Government. It is estimated that the resumption of work by these mines will mean an increase of about 25,000 tons of coal a week in Indiana. About 1000 miners are employed at the mines that were closed down.

ILLINOIS

Alton—A river terminal, equipped with loading apparatus, has been completed here and will be used for transferring coal from cars on track to Government barges for delivery to up-river points as far as St. Paul.

Galesburg—A new coal shaft is being sunk at Soperville by Lloyd Pople. The shaft is down 65 ft. and will be sunk 70 ft. more. A good vein of coal is expected at a depth of 135 ft. The mine will be prepared to hoist coal this summer.

Danville—The Big Four R. R. (Cairo division) is storing coal at Lyons for next winter. The company has laid extra track and has extra men to care for the coal. It is estimated that 50,000 tons will be stored at Lyons. The coal comes from the Ledford district, south of Harrisburg, Ill., and is low in sulphur, which fact will reduce the possibility of fire from internal heating. Another precaution is the storing of only lump coal, all other kinds being taken to different points on the road for immediate consumption.

Edwardsville—William P. Early has purchased 80 acres of land near this city for $40,000, the purchase being, it is said, for the Donk Brothers Coal and Coke Co., of St. Louis. Prior to this purchase of top ground necessary for sinking a shaft, Early had bought 10,000 acres of coal rights in the vicinity of Edwardsville, the rights being, it is believed, for the Donk interests. One new shaft will be sunk in June and will be in operation before winter. Later two mines will be sunk and eventually the entire field will be opened. The Donk interests own large mines at Maryville, Troy and Collinsville, as well as the St. Louis, Troy & Eastern R. R. which takes coal products into St. Louis.

Nokomis—The fire which started May 18 in the North Mine of the former Peabody Coal Co., near here, and was thought last week to be under control, gained renewed headway early last week and did a great deal of additional damage. Many heavy falls of slate and coal occurred and concrete props and reinforcements were destroyed. Some of the entries, it is feared, have been damaged beyond repair. The falls have added to the difficulties of the fire-fighters. The state mine rescue car and workers have remained constantly at the mine and although the heat and smoke have made it necessary for the men to work in 15-min. shifts, only one person has been overcome. The latest report is that the flames are again under control and that the mine will not have to be sealed. The damage is so great, however, that it will probably not be possible to work the mine for some time.

KENTUCKY

Carrollton—Business men of Carrollton, Ky., and stockholders of the Beattyville Coal Co., of Beattyville, Ky., operating a coal mine, have formed a new coal company to operate as the Jett Coal Co., which will be largely a transportation and jobbing organization. The new company plans to transport coal by water from the Beattyville mines down the Kentucky and Ohio Rivers to market. The steamer "Sea Lion" and nine barges have been purchased, and the company plans the purchase of another steamer and additional barges at once. The officers of the new company are Col. J. S. Jett, of Carrollton, president; George W. Calhoun, director; John Jetter and Capt. Elisha Woods, directors of transportation. Shipments will begin at once.

Foreign News

Montreal, Que.—On May 24 a fire which broke out at the George Hall coal yards, Wellington Basin, caused damage to the amount of $100,000. About 10,000 tons of coal were destroyed.

Edmonton, Alta.—Duncan McDonald, district inspector of mines in the Drumheller district, has been appointed Fuel Inspector of Alberta with authority to inspect all coal shipped and with special reference to the coal consigned to Manitoba. Care is to be taken that all coal sent to Manitoba shall be of the best grade.

Cairo, Egypt—The fuel problem in Egypt, which at one time threatened to cause the most serious hardship to the whole coun-

try, has been largely solved, says the annual report of the government's financial adviser, Sir William Brunyate, by the development of the Red Sea oil fields and the adaptation of machinery to produce gas distilled from vegetable refuse. The report declared that an "adequate supply of oil for all purposes" should shortly be available. The Hurghdada oil field, for example, although only discovered in 1914, is now yielding 15,000 tons a month.

Edmonton, Alta.—Large increases are shown in the amount of coal mined and exported from Alberta during the first three months of the year, as compared with the corresponding period of 1917. The total amount of lignite coal mined in January, February and March, 1918, was 810,972 tons, as compared with 744,700. The production of bituminous was 712,313 tons as compared with 650,319, and the anthracite output was 39,409 tons as compared with 37,817 in the first three months of last year. The amount of coal exported to Manitoba during the three-months period was as follows: Lignite, 98,195 tons; bituminous, 9958 tons, and anthracite, 602 tons, the increase over the three-months period of 1917 being 66 per cent.

Personals

James Harlor has been appointed general inside foreman of the Spring Mountain operations of the Lehigh Valley Coal Co., at Jeanesville, Penn., succeeding William F. Hamer, deceased.

John Gordon Smythe, chief engineer of all divisions of the Consolidation Coal Co., has been appointed a captain in the officers' reserve corps and will probably be assigned to construction work.

Halver Halverson, formerly mine foreman of the Lucerne mine No. 1 of the Rochester & Pittsburgh Coal and Iron Co. at Homer City, Penn., has been made superintendent of the Luciusboro mines of the Brush Creek Coal Mining Co. at Waterman, Pennsylvania.

Thomas Wendling, of Shamokin, Penn., inventor of many breaker, hoisting and coal-cleaning mechanisms, superintendent at the Bear Valley colliery, has been appointed outside district superintendent of the Pottsville district of the Philadelphia & Reading Coal and Iron Co.

Thomas A. Furniss, mine inspector for the twelfth bituminous district of Pennsylvania, with headquarters at Punxsutawney, has resigned his position. He will become general manager of the new company which will reopen the Onondaga shaft near here. Mr. Furniss, together with Donner Steel Co. interests of Buffalo, N. Y., will compose the new company.

W. M. Downer, superintendent of the Ernest mines of the Jefferson and Clearfield Coal and Iron Co., at Ernest, Penn., has been made general superintendent of the Coal Run Mining Co. and the Tide Coal Mining Co. with headquarters at Indiana, Penn. Mr. Downer will be succeeded at Ernest by Mr. Davis, formerly superintendent of the Luciusboro mines of the Brush Creek Coal Mining Co. at Waterman, Pennsylvania.

J. W. Bell has resigned as superintendent of the Marvel coal-mining operations of the Roden Coal Co. and has accepted the position of general superintendent of coal mines for the Gulf States Steel Co., with headquarters in Birmingham, Ala. Mr. Bell received his training in the coal mines of Scotland and holds a certificate of efficiency from the British Government. He was also at one time chief mine inspector for West Virginia. The scope of his work in the new position will be much enlarged.

Industrial News

Greenville, Ky.—The Beech Creek Coal Co. has filed notice of an increase in its capital from $150,000 to $400,000, to provide for expansion.

Clendenin, W. Va.—The Elk Gas Coal Co., with an authorized capital of $50,000, has been organized by E. W. Smoot, of this city and his associates.

Sergent, Ky.—The Whitley-Elkhorn Coal Co. is considering plans for the immediate installation of electrical equipment for the operation of its mines.

Barbourville, Ky.—T. C. Gilliam, president, and Oscar Jackson, secretary, of the Emanual Blue Gem Coal Co., have filed notice of the dissolution of that company.

New York, N. Y.—Burns Brothers have acquired property adjoining their coal pockets on the Boulevard, Long Island City, about 92 x 123 ft., to be used, it is said, for extensions.

Pikeville, Ky.—Rodgers Brothers Coal Co. has filed notice of an increase in its capital from $75,000 to $100,000, to provide for the proposed improvements in its plant on Shelby Creek.

Lexington, Ky.—The Elkhorn Coal Co. has filed notice of an increase in its capital from $100,000 to $600,000. The company is considering plans for extensive improvements at its properties.

Constable Hook, N. J.—The United States Government, Bureau of Yards and Docks, Navy Department, has had plans prepared for the erection of a large local coaling plant to cost approximately $130,000.

Jersey City, N. J.—Plans have recently been filed by the Central Railroad of New Jersey for the erection of two new coal-thawing plants at its pier No. 18, to cost about $188,000. Contract for the structures has been awarded.

Toledo, Ohio—Mackenzie & Schroyer, Inc., the Ajax Coal Co. and the Marquette Mining Co. announce that they have removed their offices from 1313-1314 Second National Bank Building, Toledo, Ohio, to 507 Union Building, Cleveland, Ohio.

Dorton, Ky.—The Kentucky-Elkhorn By-product Coal Co., of Shelbiana, has been organized with a capital of $50,000 and is planning for the immediate development of a large tract of local coal lands recently acquired. H. L. Cox heads the company.

Sebree, Ky.—The stockholders of the Belcourt Coal and Mining Co., Inc., at a meeting at Belcourt, in western Kentucky, on Apr. 13, decided to dissolve the corporation, and at a later meeting on May 25, officially dissolved. R. N. Carlisle is treasurer of the company.

Chattanooga, Tenn.—A big company capitalized at $1,000,000 was recently incorporated here as the Marion Coal and Lumber Co., by Herbert E. Lettes, C. L. Remtinger and Clement M. Egner. The company proposes development of coal and timber properties.

Madisonville, Ky.—In order to enlarge its operations and make several improvements in its plant, the Circle City Coal Co. has increased its capital stock from $50,000 to $100,000. R. H. Gruschow is president, and has associated with him Frank Fehr and Forest Richardson.

Elkhorn City, Ky.—The Middle Ridge Coal Co. has been organized, and is planning for the immediate development of property recently acquired at Middle Ridge. Millard Burk is president; A. J. Younce is vice president, and G. H. Francisco, secretary and treasurer, all of Pikeville, Ky.

Christiansburg, Va.—The Anthracite Coal Corporation recently incorporated, is planning for immediate development work on its tract of 2500 acres. The company plans for an output of about 300 tons for initial operations, to be increased ultimately to 1000 tons daily. C. C. Mathey, Galena, Ill., is president and manager.

Johnstown, Penn.—To take care of its rapidly expanding business, the Flood City Manufacturing Co., which manufactures section insulators and electrical supplies for use in coal mines, has leased a suite of offices in the Swank Building, Johnstown, Penn. All executive business and sales will be conducted from the new quarters.

Charleston, W. Va.—With the completion of the extension of the Coal River branch of the Chesapeake & Ohio from Seth to Whitesville, further development of mining operations is expected. A river grade will be provided from Dorothy to St. Albans, when the extension is ready for operations, cutting off a mountain grade and tunnel haul.

Louisville, Ky.—Two hundred men employed in the barge-building plant of the West Kentucky Coal Co. and the Paducah Marine Ways Co., at Paducah, Ky., went on strike on May 29, asking for an increase of 10c. an hour in wages, or from 55 to 65c. an hour. The West Kentucky Coal Co. ships considerable western Kentucky coal south by the Ohio and Mississippi, and for several years has operated its own barge-building plant.

St. Louis, Mo.—The Snow Coal Co. has been organized here by Clifford M. Snow, for several years past connected with the Consolidated Coal Co. Mr. Snow is one of the best-known coal men in the southern and western states and he has for many years past been connected with the larger mining interests in the Middle West. It is understood that he has also taken over the Liberty Coal and Supply Co.'s business, as L. C. Meid, manager of that company, has been drafted.

Cincinnati, Ohio—The Reliance Coal Co., one of the largest dealers in Cincinnati, has leased the yards on the river front formerly operated by the Marmet company, giving the Reliance an additional storage capacity of about 50,000 tons, which will be devoted largely to river coal. Additional equipment for the handling of coal at the yard will be installed at once, in order to enable the company to use the entire space, 350 x 400 ft., for the accumulation of a large supply of winter fuel.

Louisville, Ky.—The Sullivan Pond Creek Co., of Stone, Ky., lately incorporated with capital of $500,000 to develop coal properties in Kentucky, is planning big developments on 4000 acres of land and will shortly purchase equipment. Offices are at Tralee, W. Va. Officers are J. C. Sullivan, president; J. J. Morrison, vice president; J. B. Frank, secretary; L. R. Taylor, general superintendent; D. M. Goode, Williamson, W. Va., constructing engineer; W. E. Holloway, Cleveland, consulting engineer.

Toledo, Ohio—Activity prevailed at the Toledo loading docks during the past week, showing an increased movement of lake coal. The lake trade is fairly under way and the vessel movement is brisk. The Toledo & Ohio Central docks during the week ending May 31 loaded 68,000 tons, which was exactly the same tonnage loaded the previous week. The total handled since the opening of the season is 334,000 tons. The Hocking Valley docks during the week ending June 1 loaded 126,841 tons as compared with 125,596 tons the previous week, making a total since the opening of the season of 619,736 tons.

Buffalo, N. Y.—The Donner Union Coke Co. lately began the work of reopening the old Onondaga mine of the Buffalo & Susquehanna Coal & Coke Co. in the Punxsutawney district, and is now engaged in building a big by-product coke plant on upper Buffalo river in this city, convenient to both rail and water transportation. About 2000 tons of coal a day will be used. Nearly a year will be needed to get the coke plant ready, but the mine will go into operation in two months or so. Till needed for coke making the coal will be sold. Both plants will be run in the interest of the Buffalo Union Furnace and the Donner Steel Co., the former controlled by Harry Yates and the latter by W. H. Donner

Columbus, Ohio—An important change in the operation of coal trains in Ohio has been ordered by the Director General of Railroads. In previous lake seasons when the movement of West Virginia coal to the lakes was heavy much of the Chesapeake & Ohio and the Norfolk & Western coal was transferred at Columbus from those roads to the Sandusky Division of the Pennsylvania, and shipped to the port of Sandusky for the Northwest. But with a large amount of that coal going to the Atlantic seaboard the Sandusky line has not been carrying the usual tonnage. In order to equalize matters it has been ordered that coal trains originating on the Toledo & Ohio Central on both sides of Armitage be shipped over the Hocking Valley to Columbus and there transferred to the Pennsylvania for shipment to the lakes at Sandusky. This relieves the Toledo & Ohio Central lines and it is thus more able to take care of shipments from the mines directly on its own line. The rule provides that K. & L. trains be dispatched to the lakes over the Pennsylvania.

Peoria, Ill.—The Illinois Mining Institute has closed its session at the Jefferson Hotel in Peoria. Among the addresses at various sessions of the convention was one by Charles B. Scott, general manager of the National Safety Council, on "Accident Prevention." Other speakers on the program were C. W. Chappelle, of the Ironton Engine Co. of St. Louis, on "Advantages of Storage-Battery Locomotives in Mines"; Joseph C. Thompson, state mine inspector, on "Permissible Explosives"; Frank Farrington, president of the Illinois Miners' Union, who spoke on the patriotic side of the miner's work; A. J. Moorshead, president of the Madison Coal Corporation; E. A. Holbrook, of the Federal Bureau of Mines, and Senator John Dailey, of Peoria. Mr. Moorshead, one of the largest mine operators in the state, emphasized the need of better working conditions in the mines of the state and called attention to the need for greater coöperation, especially during war times, between mine operators and mine workers. A banquet and trips of inspection through various industries of Peoria were other features of the institute.

MARKET DEPARTMENT

Weekly Review

Soft Coal Production Reaches New High Mark—Anthracite Shipments Decrease—Anthracite Allotment Program Announced—Labor Question Serious—Non-Preferred Industries to Receive Little Coal—No Stocks in Dealers' Yards—Lake Shipments Falling Short

DURING the week ending May 25 the production of bituminous coal reached a new high level with a total output of 11,811,000 short tons, approximately 100,000 tons more than was produced in the preceding week. Anthracite coal shipments for the week ending May 25 amounted to 40,752 cars, a slight falling off as compared with forwardings during the week ending May 18. Telegraphic advices regarding production for the week ending June 1 indicate that there will be a sharp decline in output for that week, due to the observance of Memorial Day.

Every effort is being made to increase the output at the mines, though several factors tend to keep production from reaching the maximum. In Iowa mines were closed down during the week of May 18 for lack of orders. The same is true of mines in other Middle Western and Western states. In Alabama the miners continue averse to working regularly.

An interesting feature of the week was the announcement by the Federal Anthracite Committee on Distribution of the long-awaited allotment program. It is estimated by the committee that anthracite production during the present coal year, which will end on March 31, 1919, will total 89,000,000 long tons. Of this amount it is expected that 54,345,783 long tons will be available for domestic consumption, which is 5 per cent. more than was distributed for domestic purposes during the last coal year. The remaining 34,654,217 gross tons represents the quantity consumed at the mines, by industries, and by the railroads. New England is to receive 10,331,000 gross tons of anthracite, which is 1,497,621 gross tons more than was used in that section last year. Canada, on the other hand, will receive only 3,602,000 gross tons of hard coal this year, as against 3,856,021 tons last year. Reductions will also be made in the quantity shipped to the Middle West and the Northwest. No anthracite coal will be sent west of the Mississippi or south of the Potomac and Ohio Rivers.

Of course, it is one thing to make allotments and quite a different matter to produce the coal. The anthracite industry has lost 32,000 men since the United States entered the war—by draft, by enlistment, and by enticing wages in other industries—and now finds itself in a serious situation. Settle the labor question for the hard-coal operators and the problem of a sufficient supply of anthracite to meet all demands would be simplified.

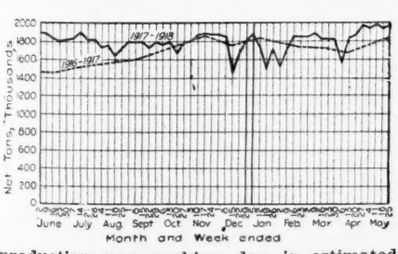
The matter of fuel priorities is being decided rapidly. No attempt is being made to disguise the fact that many non-preferred industries will fail to get coal this winter. There will not be coal enough to go around. However, systematic distribution will eliminate the uncertainties of last winter, and it is expected that domestic consumers and the preferred industries will get the coal they need.

Dealers in the chief cities on the Atlantic seaboard are far behind on deliveries of anthracite, though they report bituminous in fair supply. In the Middle West there exists a heavy demand for prepared coal, the sluggish market on fine coal having caused many operators to take on orders for mine-run to the detriment of those depending on them for lump, egg and nut coal. St. Louis reports an unusually quiet market on steam sizes, with no railroad buying to mention. Elsewhere both steam and domestic demands are insistent.

Shipments of coal by lake routes are falling short of the figures planned by the shippers. The movement in May is calculated to have been under 1,000,000 tons a week. Larger shipments are necessary if the Northwest is to have its requirements supplied before winter.

COAL PRODUCTION

Production of bituminous coal during the week ended May 25 equaled and even slightly exceeded the record week of May 11. The output of soft coal (including lignite and coal made into coke) during the week ended May 25 is estimated at 11,811,000 net tons, an increase of approximately 100,000 net tons over the production of the preceding week. The average



production per working day is estimated at 1,968,000 net tons as against 1,952,000 net tons during the week previous and 1,829,000 net tons in May, 1917. Beehive coke production during the week ended May 25 is estimated at 664,000 net tons, a decrease compared with the week of the 18th of 14,000 net tons, or 2 per cent. The average daily production is estimated at 111,000 net tons, a decrease of 2000 net tons compared with the preceding week.

Byproduct Coke—Production of byproduct coke declined slightly during the week ended May 25 due to shortage of labor in Maryland and greater shortage of labor in Pennsylvania. The ratio of production to maximum capacity for the first time since Apr. 20, fell below the 89 per cent. mark, the production during the week of the 25th being equivalent to 88.5 per cent. of maximum capacity as against 89.2 per cent. during the week preceding. Out of total losses of capacity of 11.5 per cent., 2.6 per cent. was attributed to lack of byproduct coal as against 2.8 per cent. during the week of May 18; 2.6 per cent. was due to labor shortage as compared with 2 per cent.; 4.9 per cent. to repairs to plants as against 5.3 per cent.; 0.2 per cent. to "no market" as compared with 0.3 per cent., and losses due to all other causes rose from 0.4 per cent. during the week of the 18th to 1.2 per cent.

Shortage of coal continues to be the factor limiting production in Indiana and New Jersey, although in the latter state slight improvement was reported during the week of May 25. Labor shortage in Maryland reduced the ratio of production to full-time capacity from 100 per cent. during the week of May 18 to 86.2 per cent. In Pennsylvania losses due to labor shortage rose from 10.7 per cent. during the week of May 18 to 13 per cent. during the week of the 25th. Repairs to plants caused production in Kentucky and New York to decline, while in Alabama losses due thereto were considerably less than during the preceding week. "No market" losses in Minnesota declined from 9.6 per cent. to 7.6 per cent. during the week of May 25.

CARLOADS OF COAL AND COKE ORIGINATING ON PRINCIPAL COAL-CARRYING ROADS

	Week Ended May 4	May 11	May 18	May 25
Bituminous shipments, 123 roads.	202,558	207,145	205,026*	207,349†
Anthracite shipments, 9 roads...	40,570	38,767	41,011*	40,752†

*Revised from last report. †Subject to revision.

Anthracite shipments fell slightly during the week of May 25, amounting to 40,752 cars against 41,011 during the week of May 18.

BUSINESS OPINIONS

American Wool and Cotton Reporter—On account of uncertainty in the wool supply, in available machinery and in other conditions, no good basis can be made for planning a season's distribution of woolen and worsted goods. It is not the total supply of wool which is causing anxiety, but rather the fact that some of the mills operating upon Government contracts are becoming short in supply, and it is feared that unless the situation clears up rapidly there may be a certain amount of machinery idle. There is nothing to justify some of the prices which have been asked. In cotton goods the situation has become somewhat stronger during the week under review mainly because the shortage of goods is becoming greater and buyers seem more willing to pay somewhat higher prices.

Dry Goods Economist—The plan for the coördination of the Government's interests with those of the various branches of the textile industry, announced on May 28,

makes clearer than ever the scarcity, present and prospective, of woolen and other fabrics as a result of the Government's requirements. The selling agents of woolen and worsted dress goods manufacturing concerns state that from 50 to 60 per cent. of their looms are running on Government orders and that the remainder, in so far as there is labor to operate them, are available for the production of goods for civilian use. Deliveries of woolen fabrics by manufacturers are of a hand-to-mouth character, but whatever is delivered is a welcome addition to the stock of the merchant who is lucky enough to get it. The linen shortage is as acute as ever.

Bradstreet's—Further expansion in war activities, ascending wages, excellent crop prospects, greater repression in purely civilian outputs, and widespread complaints of scarcity of goods and scarcity of men, stand out as the more prominent developments of the week. Willingness to buy, as distinguished from ability to get staple commodities, creates an air of activity, but the situation in this regard evidences fears of a famine in goods rather than real present necessity, and merchants in parts of the country are requesting that shipments of products scheduled for fall delivery be hastened.

Marshall Field & Co.—Wholesale distribution of dry goods for the current week shows a pronounced increase over shipments for the corresponding week of 1917. Road sales for both immediate and future delivery are larger than they were the same period last year. Customers have attended market in arger numbers. Collections are very satisfactory, showing a considerable increase over those of the same week a year ago.

The Iron Age—Some days may yet elapse before a balance can be struck between the definitely scheduled demands the Government will make upon the steel industry in the remainder of the year and the country's newly ascertained capacity in the various finished forms required. The committee is still hard at work both in Washington and New York. New reports are brought out of Government plans for laying hold of steel works. The industry continues skeptical as to all such news, but is in no mood to do business except at Government call. The demand for skilled labor for munition plants, shipyards and other vital industries is rapidly increasing, but men are not in sight. Plans are on foot for systematically making heavy drafts through regional committees, upon workers whose ordinary employment is gone or will be because material is withheld.

Atlantic Seaboard

BOSTON

Diminished receipts of railroad fuel a feature. Large number of mills operating on small margins of supply. No more "free" coal from the provinces for the present. All-rail receipts fall off; at tidewater the volume is short of making up the deficiency all-rail. Economies are resorted to in every direction and more and more buyers turn to steam sizes as an expedient. Other than decisions of Priority Board there is no guide for distribution; clear statement of policy much needed. District representatives, except on direct instructions from Washington, are apparently not ordering coal forward to preferred requirements in New England unless contracts are on file. Baltimore & Ohio territory rumored practically cut off all-rail from destinations this side of New York piers. Anthracite trade interested in allotment but not optimistic.

Bituminous—There are fewer cases of tangible distress among steam users than was thought probable for the period June 1 to 15. Somehow the industries manage to keep going, although very likely in the extreme anxiety to get fuel for future needs there has been enough duplication of requisitions to make the situation not quite so close to the danger line as previous estimates seemed to show. In many of the large manufacturing centers there are so many avenues of supply that it is difficult to gage receipts at individual plants with any degree of accuracy. The railroads themselves, for their own supply, frequently find certain of their storage depots almost down to bare boards on short notice, requirements and receipts will vary so from day to day. This is notably true today when all-rail receipts show a heavy reduction in tonnage of engine fuel due to complications over purchases and instructions from Washington to postpone commitments. It is also true that the railroads are suffering from the new attitude of the Fuel Administration in ordering coal to such preferred requirements as steamship bunkers and by-product plants. A year ago most of the New England roads had from three to four times as much reserve as they have today. At Boston, arrivals of water coal are being drawn against for considerable tonnages to supply the local needs of the Boston & Maine. While not in arrears to the same extent, the other roads are often finding themselves in a position where they have to lift coal off the ground instead of taking it from current receipts either by rail or by water.

Many important utilities and industrial plants are in virtually the same predicament. Even those who rely upon rehandlers with large storage facilities are not able to get deliveries on contracts and appeal to the fuel authorities for assistance. Coal is usually forthcoming on such procedure if the plant is of preferred importance, but usually the "help" is at the expense of some other preferred user who is forced into the same difficulty a few days later. No remedial measures seem to be in sight, and buyers are utterly at loss how to proceed to get coal. Such "contracts" as they have made are only 40 to 60 per cent. productive, and the fact is plain that only by doubling up on their requisitions both all-rail and at tidewater, together with other expedients, are they able to keep in operation on slender stocks.

The 100,000 tons of Dominion coal arranged for at Sydney, C. B., to load the lake-built steamers now coming into the coastwise service is all that can be had from this source for the present. The coal having been tried and found desirable by several of the large buyers, the Shipping Board has already been urged to arrange further deliveries. It is understood, however, that the first lot was furnished under such special circumstances that no additional shipments are looked for, at least for the present.

The volume of bituminous received through the great gateways continues to show a serious shortage as compared with a year ago. May showed an average movement of 470 cars per day commercial bituminous, a drop of 80 cars, or 14⅓ per cent. from the 1917 total for the same month. Railroad fuel showed a drop of 312 cars, or 76 per cent., the average movement of cars passing the gateways daily for this purpose being only 98 as against 410 a year ago.

Tidewater receipts are not any more encouraging except from Hampton Roads, and the latter fall far short of making up the shortage all-rail. Available figures covering Hampton Roads dumpings for New England during May show 983,136 net tons, a gain of 192,038 tons over May, 1917.

The total net loss for May, therefore, is 530,308 net tons, an alarming figure when all estimates were based on heavy gains during the summer months. All this is an argument against zoning of consuming territory as between rail and water delivery, except possibly Maine, where the elimination of all-rail delivery would probably work no great hardship. For the rest of New England, the best opinion inclines to the present distribution unrestricted as to destination whether from the gateways or from tidewater ports. The fact that the nearly 10,000,000 tons received all-rail last year went to make up deficiencies by water should be reason enough for allowing coal this year to run to points adjacent to tidewater, unless there should be a material increase in water-borne coal. At this writing, no sufficient increase is in prospect.

At Hampton Roads the balance between ships and coal has been maintained until within a few days, when once more there is beginning to be a surplus of ships over coal. This excess of bottom is sure to increase the next few weeks for three reasons: the number of new vessels in the service, the number coming out of repair yards, and recent orders of the fuel authorities, directing the flow of coal west rather than to tidewater. At this writing, there is a good chance that submarine activities early this week will materially reduce the number of arrivals at the piers.

The conservation department of the Fuel Administration is busy urging economies in the different steam users, the latter having naturally, of their own initiative, made headway in the same direction. Much attention is being given patent stoking, even by relatively small manufacturers, and there have been some interesting results, particularly with respect to anthracite steam sizes. One mill using 3500 to 4000 tons weekly is able to use three parts birdseye or barley to four parts bituminous, and grades of the latter that were never suspected of working satisfactorily in such combination have been used to excellent result. The demands for washed rice and barley have therefore increased by leaps and bounds, and the prudent buyers are those who are taking liberal shipments now, while the going is good.

Anthracite—Receipts neither all-rail nor at tidewater have as yet shown the expected increase. At tidewater the difficulty is still with barges and towing power, particularly for destinations around Cape Cod. It will probably be several weeks before New England feels the result of restricting domestic sizes from the Middle West and from the South Atlantic States. If there are not barges enough to move what is now reaching the piers at Philadelphia it is hard to see how this movement can be increased materially.

All-rail figures for May show a daily average of 454 cars domestic sizes through the five gateways. In net tons this means 634,005 compared with 556,089 tons in May, 1917. The average daily number of cars of anthracite steam sizes during May, 1918, was 168, or 27 per cent. of the total anthracite receipts at the gateways. This was a somewhat increased proportion of domestic sizes, in itself a favorable sign.

Mr. Storrow has offered to get a certain number of deep-sea barges transferred from bituminous trade should that prove necessary. Developments the next fortnight will bear watching, in the interest of New England.

NEW YORK

Demand for anthracite domestic sizes continues strong, with supplies below requirements. Dumpings at the local tidewater docks show increase over preceding week. Line trade wants coal. Settlement of railroad fuel question results in better car supply, but tidewater stocks are low.

Anthracite—Demand for the domestic sizes continues to be far in excess of the supply, and dealers who are fortunate enough to have good connections have so far been unable to stock any considerable amount in anticipation of next winter's orders. Many of the smaller dealers are still unable to secure sufficient of the larger sizes to take care of their trade, and for that reason the bins are practically empty.

With the Government report for the week ended May 25 showing a decrease of 259 cars shipped than were shipped during the preceding week, dumpings at the New York tidewater piers for the week ended June 3 show 6542 cars, as against 6205 cars the preceding 7 days, an increase of 337 cars. This city did not, however, receive all of this tonnage, much of it being sent by water to Long Island Sound points and into New England.

Further conferences have been held by the local authorities and coal men with a view of providing for the storing of 300,000 tons of coal to be sold to the poor next winter but so far nothing of a conclusive nature has resulted. The principal subject of discussion is to find a place where the coal can be stored. Other conferences are to be held.

Conditions appear to grow more serious. Supplies are not keeping pace with the demand, and the most optimistic of the trade confess to seeing a lack of coal next winter unless further curtailments and restrictions are ordered and more coal is sent to this market.

Dealers are interested in the statement of the Anthracite Committee of the Fuel Administration showing the distribution of anthracite for New York State for the year 1918-1919 to be fixed at 15,855,300 tons, as compared with 14,169,809 tons for the year 1916-1917, an increase of 11.89 per cent.

The line trade is as active as the trade in this city. Dealers are practically in the same position. They are short of coal and their books are filled with orders.

The anthracite steam sizes are moving freely. Buckwheat No. 1 is scarce except in the cheaper grades. Rice and barley are not in over-supply. While some of the cheaper grades of barley were quoted during the week at $4 f.o.b., the better grades were held at $5.25 f.o.b. with rice at $1 higher.

Current quotations, per gross ton, f.o.b. tidewater, at the lower ports are as follows:

	Circular	Individual
Broken	$6.55	$7.30
Egg	6.05	6.80
Stove	6.30	7.05
Chestnut	6.40	7.15
Pea	4.90	5.65
Buck	4.45@5.15	4.80@5.50
Rice	3.90@4.10	3.80@4.50
Barley	3.40@3.65	3.00@4.00
Boiler	3.65@3.90	.....

Bituminous—The situation shows comparatively no change from last week. Supplies of commercial coal are scarce, except to regular customers, and there is practically no free coal in the harbor. Bunker fuel is in better supply.

The result of the settlement of the railroad-fuel question is already being felt. Cars are in better supply, but the labor situation is such that some operators find it difficult to load all the cars assigned to their openings.

The U-boat ravages along the coast early this week, which resulted in at least the sinking of one coal-laden schooner bound for New England, with nearly 2000 tons on board, will no doubt result in fewer shipments between the Southern ports and the New England States, and a heavier drainage on the New York tidewater market. Heavier insurance rates is one of the direct results of the raids. It is also expected that a reduction in shipments from the Southern ports, will cause consumers in those states to expect larger tonnages from central Pennsylvania.

Producers and shippers are having some trouble to choose between the essential and nonessential industries as indicated by the Fuel Administration. In many instances the consumer is referred to Washington for a ruling.

The dumpings at the New York tidewater piers for the week ended June 3 totaled 6393 cars as against 6285 cars for the previous week, while the Government statistics show that during the week ended May 25, 207,349 cars were shipped to market as against 205,026 cars for the week ended May 18, an increase of 2123 cars.

PHILADELPHIA

Anthracite allotment increased. Mine labor supply slowly decreasing. Doubt as to last year's tonnage being equaled. New England gets preference. New freight rates effective soon. Dealers behind on deliveries. New yard owners to get fuel. Bituminous conditions much improved. Car supply growing satisfactory. Price reduction of 10c. causes little comment.

Anthracite—The most interesting feature of the week was the announcement by the Federal Anthracite Committee on Distribution of the anxiously awaited hard-coal allotments. When the dealers learned through the daily press that Pennsylvania's quota was to be increased by 18.25 per cent. most of them at once clamored for recognition in its distribution. Many seemed to think they were to receive this percentage of increase over their last year's tonnage and were congratulating their shippers and themselves. At this time there is no satisfactory information available to the retail men. The first shock of disappointment came when the sales agents told all inquirers that the increase is over the tonnage of the basic year 1916-17 and that it has not yet been decided into what territories of the state the excess coal will be applied. Unquestionably Philadelphia will need much of it and make an urgent appeal for a large proportion. As a matter of fact word is reported to have come from the office of the local administrator that he is trying to secure 25 per cent. of the added tonnage for the city. It is understood that this increased allotment is made possible by shutting off shipments to the states which are expected to depend upon native soft-coal mines. Yet one important fact seems to have been entirely overlooked, and that is with an increase of 18¼ per cent. over 1916-17 the tonnage will barely equal the amount of coal that came to this market in the past year.

Early in the week the shippers who have been consigning coal to New England received positive instructions to ship into that territory during June one-twelfth of its yearly quota as originally planned plus 50 per cent., or actually one-eighth of its entire year's tonnage in June. These instructions are startling and have greatly upset the dealers here. At the offices of at least two of the largest shippers the local trade is cautioned not to plan for heavy shipments this month and the New England order is being given as the reason. It is beginning to look, too, as if this order will not be effective for one month alone, but may continue for some time; and if continued would give New England its entire supply in eight months. In order to assist the movement via tide to that territory the Government has been assigning barges and also has given heavy orders for new equipment, some being of the new concrete type.

It has been a hard week for the trade here. Some of the heaviest buyers have no stock to speak of and they are being harassed by their customers as never before this spring. Many families planning to leave the city are demanding coal before they close their homes, and also, on account of the advance in freight rates, effective on June 25, practically every buyer wants his coal before the new prices, which will be made to cover the latest freight advance, are announced. There is some speculation as to the recent freight advance, as to whether it will be in addition to the 15c. per ton advance which has been effective but a few weeks. Up to this time the 15c. increase has not affected this city, but outlying points have now been paying it for the past two weeks or more.

On account of the light deliveries recently it will be impossible for the dealers to deliver more than a small proportion of the orders on hand. Yet the fuel authorities continue to advise "promptness in ordering and patience in delivery." The public long ago responded substantially in placing their orders, but it fails to realize that deliveries must necessarily be spread over a period of not only weeks, but months. This week we talked with a number of dealers who are refusing to book any additional business, except from old customers, who for various reasons have delayed placing their orders. They are so hopelessly behind that they fear their inability to furnish even their best trade with more than two-thirds of their requirements. The local administrator continues to cut down on orders as sent to him by the retailers. These reductions as made by Mr. Lewis are seldom substantial but are sufficient to show that his office is scrutinizing every order.

An unpleasant tangle affecting several dealers here has just been straightened out by a ruling covering yards which have been sold or dealers who have commenced business since 1916 and therefore are not covered by the 1916-17 basis. They are to receive a "reasonable" tonnage from the producers or distributors, who furnished the yards previously in business, although as to the very few entirely new yards no exact instructions have been issued other than that they are to receive coal.

Buyers of coal by the carload who for some weeks past have been able to secure their coal supply as usual, except that it had to be hauled by the retailer, experienced something of a jolt this week, when the fuel authorities intimated that they were about to shut down upon the practice. It will be recalled that the National Administration ruled against the practice, but allowed the various state administrators to introduce any modifications they saw fit.

The prices per gross ton f.o.b., cars for line shipments and f.o.b Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken	$4.90	$6.05	Buckwheat	$3.15	$3.75
Egg	4.50	5.70	Rice	2.65	3.65
Stove	4.75	6.05	Boiler	2.45	3.55
Nut	4.85	6.10	Barley	2.15	2.40
Pea	3.45	4.35			

Bituminous—The bituminous trade is experiencing the best conditions that have existed for months. As has been reported in this column for a period of six weeks past there had been a gradual increase in the tonnage of coal received in this market. Therefore the most gratifying feature of the present situation is that the improvement has been a gradual growth, which indicates permanence, at least for the summer. The car supply has jumped upward, especially in the Central Pennsylvania district. As a matter of fact one large operator in that region states he actually had more cars allotted to him this week than he could load. It has been some time since the bituminous trade has been so optimistic. Of course, the demand for coal is still tremendous and many plants claim they are not getting their full requirements, yet the storage stocks are continuously increasing.

The fact that the Government administrative organizations in the settlement of the railway-fuel price controversy reduced the price 10c. a ton, did not produce a ripple of comment in the trade. Inasmuch as the car supply gives promise of continuing in good volume the shippers are satisfied. They are also particularly gratified at the statement of C. H. Markham, the newly appointed director of railroads for the Allegheny region, who said that as 80 per cent. of the coal in the United States was mined in his territory it was to be his special duty to see that the greatest possible transportation efficiency be obtained

BALTIMORE

Plentiful supply of bituminous due to diversions. Anthracite receipts light. "Coal Week" is abandoned.

Bituminous—A careful inquiry in the trade here shows that coal is flowing into Baltimore in liberal quantities. Not only is there a good supply at tide, where a fuel administration order stopped the rerouting of all coal to line points in and near the city and required all to be dumped over the piers, but enough is coming through on all-rail direct consignment to ease off any other immediate fuel emergency. In some cases, particularly in connection with waterfront factories that have profited by the non-diversion order for coal after reaching the Maryland administrator at tide, there has been the first substantial move toward stocking up for the future. The liberal supply of coal here for business use is due almost entirely to the diversion of coal at the Cumberland gateway. The Railroad and Fuel Administrations are now working hard to prevent congestion through allowing loaded coal cars to be piled up on sidings at northern railroad connection points, and when there is the slightest evidence of a jam the coal is rerouted to this city and other points where it can get through without interruption of traffic. It is this coal that has placed Baltimore in most favorable supply situation for the time being.

Baltimore jobbers are looking with interest to a move to be made following the National Jobbers' Convention in Buffalo for a possible revision of the schedule of profit margin. The executive committee of the jobbers held a conference in Washington recently with Cyrus Garnsey, of Dr. Garfield's force, and it was urged that the margin of profit to jobbers was so small that some were in danger of being forced out. The Fuel Administration has acknowledged the important part being played by the jobbers and is said to be desirous of holding them in effective service. To this end jobbers all over the country have been preparing statements from cost sheets, etc., to prove that a revision is necessary. Revisions granted operators and retailers have encouraged the jobbers to hope for similar concessions when the justice of their claim is shown by facts.

Anthracite—The receipts here of hard coal remain below the normal, while the demand has undoubtedly increased. At the present time there are orders on the books of the retailers here for probably nearly 400,000 tons of hard coal for domestic use. Since Apr. 1 the trade has delivered about 125,000 tons, part of which was drawn from their small yard supplies, so that there probably remains less than 7000 tons in dealers' yards here at present as a reserve. The receipts of anthracite here in April were 67,128 tons, and in May fell back to less than 55,000 tons. The normal receipts for May should have been around 65,000 to 70,000 tons. Baltimore's needs are now figured to be 20 per cent. in advance of former years, due to the fact that bins of dealers and consumers were swept clear before this spring came and due to natural growth of the city and war-plant growth. The result is that a deficit is being built up here for next winter. In view of the short supplies the abandonment of a coal order week here was hailed with delight by the retail dealers. It was pointed out that they could not deliver the two-thirds of their present orders this summer unless deliveries were speeded up, and that the 10 per cent. increase in anthracite allowed by the Anthracite Committee of the Fuel Administration, a total of some 93,000 tons, even if diverted to Baltimore in full would fall some 80,000 tons short of the amount estimated as needed here by the Maryland Fuel Administrator.

Lake Markets

PITTSBURGH

Coal movement quite unsatisfactory, permitting much less stocking than is desired. Advanced freight rates. Lake movement proceeding smoothly.

There is almost universal complaint as to the volume of coal movement, both from the Pittsburgh district proper and from the Connellsville region. It is only in rare instances that there is not enough coal delivered for current operations, but the excess shipments are altogether too small to permit coal to be stocked at the rate that should prevail now to insure full operations through the winter. Naturally little hope can be entertained that coal can be moved at anything like as good a rate as in the summer, hence it is imperative that large reserves should be accumulated both for steaming and heating purposes and for byproduct coking.

The present situation is regarded as particularly unfortunate in view of the advance in freight rates that is to become effective June 25, as coal consumers would like to move a maximum tonnage before the rate advance goes into effect. The advances are 15c. when the present rate is 49c. or less per net ton 20c. on rates 50 to 99c., 30c. on $1 to $1.99, 40c. on $2 to $2.99 and 50c. on higher rates. Generally speaking, the 15c. advance will apply on shipments from the Pittsburgh district proper to consuming points in the Pittsburgh district, also from Pan Handle points to Steubenville. The 20c. advance will apply from the Pittsburgh district to the valleys and lake shipping ports, and from the Upper Connellsville to the valleys, while the 30c. advance will apply on Pittsburgh district to Toledo and Cleveland and from the lower Connellsville to Youngstown. Averaging the tonnages used in byproduct coking, the advance on Pittsburgh

district coal will average somewhat over 20c. and on Connellsville coal the average will run about 30c. The new rate to Youngstown, where there is very large consumption in steel mills for power and producer gas generation, as well as for by-product coking, will be $1.05 from the Pittsburgh district, $1.15 from the Upper Connellsville and $1.30 from the lower Connellsville.

There is a better movement in the retail trade owing to efforts of the Fuel Administration to induce retail dealers and their customers to stock up against the winter. Lake shipments are moving with considerable freedom and no congestion has resulted thus far. Returns from blast furnaces showing their ore requirements for the season indicate that somewhat more than 60,000,000 tons of ore should be brought down the lakes this season, against early estimates of 55,000,000 tons. There will be ample vessel capacity for all the coal that is to be moved, the neck of the bottle being the railroads that serve the Lake Erie docks.

The market remains quotable at the 10c. reduction effective Saturday morning, May 25: Slack, $2.10; mine-run, $2.35; screened, $2.60, per net ton at mine, Pittsburgh district.

BUFFALO

Bituminous in good supply. Anthracite supply normal. Lake shipments up to average.

Bituminous.—Canada is not calling for much bituminous except in secluded districts. Some sections are over-supplied and refuse to buy in any quantity. Buffalo has plenty, and the state generally is fairly well supplied. Here and there come reports that certain consumers are stocking up, but as a rule they are buying as they need it. They do not appear to take much stock in the reports of winter shortage, even after the experiences they have had.

Jobbers are not finding much business to do. The operators and the consumers are getting closer together, as is usually the case when coal is not plenty. The prices of bituminous will have to be restated on the basis of a 10c. reduction of mine prices and a 30c. advance in freight for this territory, making the f.o.b. Buffalo list $4.65 for thin-vein Allegheny Valley, all sizes; $4.45 for Pittsburgh mine-run and $3.95 for Pittsburgh slack, all per net ton.

Anthracite—The supply is about normal here and the lake shipments are now well up to the average, though the late entrance into lake loading by all but one shipper has reduced the season amount as compared with last season to June. A holiday last week reduced the total somewhat. City consumers complain that they are not getting their coal when they ask for it, and some of them are inclined to complain; but the authorities are firm. The distribution goes by rule. The Government fuel office is in full operation, but no great amount of regulation work has to be done there. The shippers see to that.

The great pressure for coal comes from Canada, but the rules are fixed and they are kept in that trade the same as at home. Some buying of bituminous there is reported, but considering its plentifulness the consumer is not embracing the opportunity as he should. It is reported that farmers are cutting quantities of wood, but the Buffalo consumer still depends on the mines, even though the partial giving out of natural gas will increase the winter consumption of anthracite perhaps a half.

Shipments by lake for the week were 72,450 net tons, of which 30,900 tons cleared for Chicago, 20,459 tons for Duluth or Superior (consignee's option after sailing), 10,300 tons for Sheboygan, 4500 tons for Milwaukee, 3300 tons for Manitowoc and 3000 tons for Hubbell. Rates are 75c. to Hubbell, 60 to 65c. to Chicago, 55c. to Milwaukee, 50c. to Manitowoc and 48c. to Duluth.

Shipments for May were 293,850 tons as against 424,700 tons for May last season; for the present season, 452,606 tons as against 622,495 to June last season.

DETROIT

Neither bituminous nor anthracite show increase in shipments. Lake movement below expectations.

Bituminous—Both dealers and consumers are inclined to view the outlook in the matter of Detroit's future coal supply with a good deal of apprehension. The present movement of coal into Detroit little more than meets current requirements, and no indications that a more plentiful supply will be obtainable are visible. Receipts of bituminous coal in Detroit during May averaged about 415 cars daily, while to the remainder of the state only 444 cars were supplied. Coal men place Detroit's normal requirements at approximately 700 cars. This estimate, however, was made several years prior to the war and the present needs probably are greater.

The shipments arriving in Detroit differ from the supply received in previous years in that the larger part of the consignments are made up of mine-run coal. While there is a certain amount of slack, nut and pea coal coming with the mine-run, the quantity is said to be insufficient to supply customers who want slack.

The supply of domestic sizes also is said to be much less than dealers would desire. The fact that domestic consumers have not been active buyers has enabled some of the retailers to accumulate large stocks.

Anthracite—Uncertainty as to the supply of anthracite that will be made available in Detroit and concerning the time when it will be sent here continues. Records of the transportation companies show that in May the average daily receipts were only 32 cars, while the remainder of the state was given an average of only 50 cars daily. Domestic consumers who are eager to provide for winter needs are unable in most instances to get orders filled. Retail dealers have only a few tons on hand and are continuing the system in many cases of declining to accept orders when stock is lacking to fill them. The situation is far from favorable to make a success of coal buying week.

Lake Trade—Shipments of coal by lake routes are also falling short of the figures planned by shippers. The movement in May is calculated to have been under 1,000,000 tons a week. Larger shipments are necessary if the Northwest is to have its requirements supplied before winter.

COLUMBUS

Strength characterizes the coal trade in Ohio. Lake trade is booming, and steam and domestic demand holds up well. Production is fairly good.

The coal trade in Ohio territory has remained firm during the past week. Buying for domestic and steam purposes is active. In fact all branches of the trade are vying with each other in getting stocks ahead. The lake trade is active in every way and a large tonnage is being moved to the Northwest. The tone is generally satisfactory under the unusual war conditions. Prospects are for a continuation of the stiff demand.

Domestic business is still one of the most important departments of the industry. The campaign to "Buy Now" is having its effect, and a large amount is being purchased by retailers. Dealers report a heavy demand in all sections as consumers are anxious to get their fuel in for next winter. As a result of the heavy demand many dealers have small stocks and are gradually exhausting their surplus. Retail prices have declined 10c. on the ton to correspond with the reduction at the mines. Little Pocahontas is coming into the local market as most of the production of that section is going eastward. Considerable West Virginia splints are being sold, but the main bulk of the coal now being laid in is from the mines of the Hocking Valley and Pomeroy districts.

Lake trade is strong and the tonnage moving to the Northwest is gradually increasing. The vessel movement is good and lake shippers report greater efficiency than ever. Lake shipping permits have now been granted and all who have lake contracts are participating. The ore movement is also good. Taking it all in all the prospects are good for the early filling of lake requisitions.

Steam business is one of the strongest points in the market. The larger consumers are buying both for present and deferred delivery, following the policy of laying in a surplus to guard against emergencies. Railroads are heavy consumers and in some districts are taking about one-third of the output. The smaller users are also trying to insure a fuel supply by making connections and filling available storage space with surplus stocks.

Production has been rather good despite the fact that a holiday intervened during the week. The day following was also a holiday at most mines. Extreme hot weather is having an effect in reducing the production. Labor shortage is reported in certain mining districts.

Prices on short tons f.o.b mines are as follows:

	Hocking	Pomeroy	Eastern Ohio
Sized grades	$2.60	$2.95	$2.60
Mine-run	2.35	2.70	2.35
Screenings	2.10	2.35	2.10

CINCINNATI

Continued heavy demand features all departments, increased freight rates to become effective having given an additional stimulus. Trade is settling down to a summer of unprecedented activity.

One of the outstanding features of the past week in the coal trade was the announcement of increased freight rates, effective June 25. Inasmuch as the increased rates will add about 30c. a ton to the cost of coal in Cincinnati, the immediate effect was a still further increase in the volume of orders, many consumers being brought to an immediate decision to order their winter supply who had until then delayed in placing their orders. Of course, such orders in the vast majority of cases will not be filled before the new freight rates go into effect, as dealers have for some time found it impossible to keep up with their orders. The additional freight cost will be charged from the date indicated, it is generally assumed, even on coal already in the yards, as the higher freight rate will be part of the replacement cost of all fuel in this section. Dealers generally, in accepting orders or in soliciting them, are warning consumers that prices cannot be guaranteed, and that orders cannot be accepted save for delivery at such prices as may be prevailing at the time of delivery. In general, this is not having the effect of retarding orders, however, the number of consumers who are holding off on account of the present undeniably high prices being comparatively small, and of no importance in the market, in view of the inability of the trade to take care of the business already booked.

LOUISVILLE

Demand for all grades of coal good, with numerous inquiries from industrial concerns for stocking coal. Car supply still short, with labor steadily leaving mines for other industries.

A 10c. per ton reduction was made in the mine price of lump coal last week, thus placing the new price at $2.55. However, retail dealers will average inbound shipments en route at that date with coal on hand in yards, and the difference will not be much more than 3c. a ton. During the past two weeks the weather has been hot, and domestic consumption has necessarily been light for immediate use. However, stocking orders have been plentiful, and the domestic demand, from the viewpoint of operators, jobbers and retailers, has been much better than in any former year on record.

The 25 per cent. increase in freight rates recently announced by Director General McAdoo is expected to have little real effect on business, as a general increase affecting everyone alike will merely mean that the ultimate consumer will have to pay the freight. Few orders have been taken by the coal trade that did not carry provisions subject to change in event of increases in freight rates; whereas in many trades prices were made f.o.b. points to which merchandise had first to be shipped, there was little of this in the coal trade. However, with thousands of merchants endeavoring to get under cover between now and June 25, it is expected that railroad tonnage movement will be considerably increased, resulting in a still further shortage of cars and labor.

Retailers through their local board have been endeavoring to secure an increase in margins due principally to the increased cost of all labor, which has resulted in the margin being a bit short of what it was a few months ago, when it was made effective. At the present time it is next to impossible to secure men for loading and unloading cars in the local yards.

The daylight-saving plan has had a remarkable effect on the volume of coal consumed by public service corporations during the past few weeks. The industrial load during the daytime has been much heavier this year than usual due to general industrial activity, but with daylight until nearly 9 o'clock, domestic, store window and other consumption has fallen off materially, resulting in a corresponding decrease in the fuel consumption.

BIRMINGHAM

Trade strong and active in both domestic and steam sizes. Supply perhaps a little improved as a whole. Car supply good, but mine workers are not yet putting in full time, which is preventing any appreciable increase in the output.

As far as inquiries go, local conditions are highly satisfactory, the supply being the matter of concern, as has been the case for some time. Both steam and domestic users are insistent upon shipments, and the deficiency in the available tonnage is furnishing a knotty problem for the brokers and distributing agencies in apportioning it among their customers, with the due regard which has to be given to the priority class.

Domestic wholesale and retail prices were boosted 45c. per net ton on May 16, when the wage agreement allowing this increase was placed in effect, and suffered a reduction of 10c. per ton in accordance with the agreement in connection with railroad-fuel contracts. Receipts of domestic coal continue light, with a good demand from the householder. Retail prices are about as follows on prepared sizes: Big Seam, $5.60; Cahaba and Black Creek, $6.25; Corona, $5.90; Montevalle, $7.15.

There is still a pronounced shortage in steam coal to cover requirements, but as this condition has obtained for some time customers are registering few complaints, merely exerting their efforts to get as near as possible to their approximate needs. Mine price schedules have changed twice recently, and the following prices are now in effect:

	Prepared Sizes	Mine-Run	Slack and Screenings
Big Seam	$2.80	$2.50	$2.20
Cahaba, Black Creek, Brookwood and Blue Creek	3.45	3.20	2.80
Pratt, Jagger, Jefferson, Nickel Plate	3.00	2.70	2.40
Corona	3.10	2.75	2.40
Montevalle	4.35	2.75	2.50

Coke

CONNELLSVILLE

Labor performance unsatisfactory; car supply causes little difficulty. Better coke and more efficient blast furnace operations. Effect of freight advances. Production stationary.

With the increased car supplies in the Connellsville region the past few weeks a shortage of labor has been uncovered, and in general the limit in production now is the supply of labor rather than the supply of cars. Frequently cars have to be held over a day for loading. It is asserted that there is a sufficient number of men on the payrolls, but the men do not work full time, hence there is a shortage in performance rather than in men. However, there have been numerous holidays lately, religious and otherwise, and from now to Independence Day labor performance is expected to be better.

Connellsville coke production has been running at about 340,000 tons a week for several weeks past, and it develops that this amount is nearly if not quite sufficient for the operation of blast furnaces now dependent on the region. In 1916 the movement was about 420,000 tons a week, but since then the completion of many by-product ovens has decreased the requirements for Connellsville coke, though much Connellsville coal is moving out instead. In the winter it appeared, from a study of the losses in production by the furnaces, that for full operation close to 375,000 tons of Connellsville coke would have to be supplied, but it now apears that with regular shipments the quality of coke has come closer to standard while the furnaces do not have to bank or run at gaited rates, the result of these influences being that more pig iron is made per ton of coke and the increase in pig-iron production has been greater than the increase in coke production.

The freight advances that go into effect June 25 are as follows on Connellsville coke: When the present rate is 49c. or less per net ton, 15c., this applying to practically no Connellsville coke; on 50 to 99c., 25c. applying to Pittsburgh and making the new rate $1.15; on $1 to $1.99, 40c., applying on Wheeling and the valleys, making a rate of $1.75, on Cleveland making the rate $2.15 and on Erie making the rate $2.20; 60c. on rates $2 to $2.99, making $2.60 to Toledo and Buffalo.

The Connellsville "Courier" reports production in the Connellsville and lower Connellsville region in the week ended May 26 at 340,100 tons, a decrease of 3170 tons.

Middle Western

GENERAL REVIEW

Dr. Garfield's order reducing prices on Illinois and Indiana coal 10, 15 and 20c. per ton the principal event of the week.

Coal producers received a considerable shock during the week past when they were notified of a 10c. per ton reduction in the prices of all grades, and the cancellation of all temporary clean coal permits except to the mines that had washers and mechanical devices.

A noteworthy feature of the past week at several producing centers is the increased car supply, some operators receiving all the cars they could load. Dealers and domestic users were optimistic over the price reduction, but the news of a substantial increase in the freight rate of more than enough to overcome the reduction in coal prices acted somewhat as a dampener.

The continued heavy demand for prepared coal and the slack fine coal market has caused the sales managers of quite a number of companies to take on mine-run orders, much to their dislike and to the detriment of those depending on them for lump, egg and nut coal.

The hard coal situation continues to grow worse each week, and it begins to dawn on all fuel users that they will be compelled to depend on the Middle West producers for coal and forget they have heretofore used hard or Eastern smokeless.

CHICAGO

Decrease in prices of coal and increase in the freight rate cause more or less confusion.

A wild scramble for better grades of coal from the Williamson-Franklin County field was caused by the substantial freight-rate increase during the week. All producers in southern Illinois, including Saline County, have business booked of sufficient volume to operate their mines with a full-car supply for an indefinite period. Dealers are insistent that their orders have preference over those of their neighbors, and the result is that sales managers are compelled to listen to entreaties daily until their position has been rendered one of constant strain.

While there is a good market for all grades of prepared coal in this market, screenings from the central and northern Illinois fields are selling off. Southern Illinois operators are not experiencing any difficulty in disposing of their fine coal at full Government price.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Williamson and Franklin	Saline and Harrisburg	Fulton and Peoria	Spring-Springfield	Carterville	Grundy, La-Salle, Bureau and Will.
Steam lump	$2.55@2.70	$2.55@2.70	$2.95@3.10	$2.55@2.70	$2.55@2.70	$3.25@3.40
Domestic lump	2.55@2.70	2.55@2.70	2.95@3.10	2.55@2.70	2.55@2.70	3.25@3.40
Egg or furnace	2.55@2.70	2.55@2.70	2.95@3.10	2.55@2.70	2.55@2.70	3.25@3.40
Small egg or nut	2.55@2.70	2.55@2.70	2.95@3.10	2.55@2.70	2.55@2.70	3.25@3.40
Stove	2.55@2.70	2.55@2.70	2.95@3.10	2.55@2.70	2.55@2.70	3.25@3.40
Chestnut	2.55@2.70	2.55@2.70	.....	2.55@2.70	2.55@2.70	3.25@3.40
Pea	2.55@2.70	2.55@2.70	.....	2.55@2.70	2.55@2.70	.....
Washed egg	2.75@2.90	.....	.....	2.75@2.90	2.75@2.90	3.45@3.60
Washed stove	2.75@2.90	.....	.....	2.75@2.90	2.75@2.90	3.45@3.60
Washed nut	2.75@2.90	.....	.....	2.75@2.90	2.75@2.90	3.45@3.60
Mine-run	2.35@2.50	2.35@2.50	2.75@2.90	2.35@2.50	2.35@2.50	3.00@3.15
Screenings	2.05@2.20	2.05@2.20	2.35@2.50	2.05@2.20	2.05@2.20	2.75@2.90
Washed slack	2.05@2.20	.....	.....	2.05@2.20	2.05@2.20	2.75@2.90

MILWAUKEE

An organized effort is being made to round up coal orders. Receipts by lake continue slow. Wisconsin's allotment of anthracite reduced.

A coal-ordering drive is on in Milwaukee and consumers are responding satisfactorily, according to State Fuel Administrator Fitzgerald. When the investigation of the cost of handling coal over the docks is completed, and prices are fixed, it is expected that ordering will become more brisk. It ought to be an easy matter to determine Wisconsin's coal needs during the winter season without waiting for individual orders to pile up, as reliable statistics covering the coal business for years past serve as an open book.

The movement of hard coal up the lakes is slow at present. Milwaukee has been averaging one medium cargo per week. Since last week's report one cargo of 7897 tons has been received. Soft-coal receipts during the same period aggregated 100,404 tons. Cargo receipts for the season thus far embrace 73,045 tons of anthracite and 422,091 tons of bituminous.

With one exception, firms which have received hard coal are delivering the same to consumers at whatever price the fuel administrator may name. The leading dock company is holding up deliveries, however, until some adjustment as to price has been reached. The situation is entailing hardship upon a small army of middlemen who have been forced to maintain their teaming outfits in idleness for some time. Coke is being delivered freely, however.

Wisconsin is to get less anthracite this year, a cut of 13.36 per cent. in the state's allotment having been ordered by Federal Fuel Administrator Garfield. The state will be allowed 1,024,000 tons of anthracite for use during the year beginning Apr. 1, 1918, and ending Mar. 31, 1919. Last year's quota was 1,181,926 tons. If increased labor shortage should still further curtail the total production, Wisconsin will get proportionately less. In consequence of the reduction in the anthracite supply, consumers who have been using anthracite exclusively in the past will have to put up with 10 per cent. of bituminous coal.

ST. LOUIS

An unusually quiet market on steam sizes, with no railroad buying at all to mention. A surplus of coal still on hand in the Standard field and a fluctuating market. Car supply fair. Critical situation in the Middle West on account of hard coal ruling.

The situation in the West at the present time is one of extreme anxiety on the part of the public, who have been led to believe throughout the spring months that they would receive their share of anthracite coal. Now comes advice from Washington that no anthracite coal will be permitted to come to Mississippi River points or west.

Throughout the entire State of Missouri there is much hardship and an enormous loss in actual money as a result of this ruling, for equipment in thousands of homes must be thrown out and discarded in order to make room for furnaces that can burn another kind of fuel.

The dealers have booked orders for thousands of tons, and the public are insisting that they get the coal. A small tonnage of anthracite is moving in; so small, that it does not count for anything.

The conditions in the bituminous industry have not changed much in the past several weeks. In the Carterville field there still continues to be a demand that so far exhausts the supply that it will take months before the mines will be caught up.

The car supply is not good on the Iron Mountain or Illinois Central and transportation on those roads is also bad.

Conditions in the Mt. Olive field are extremely good. The demand is equal to the supply. Working conditions are better than usual, the car supply is fair, and the transportation right now is nothing to complain of.

In the Standard field the screening market is in a deplorable shape. Coal restricted to St. Louis brings as low as $1.40 for screenings. Mine-run is $1.90, while lump has been going as low as $2.20.

Railroad buying is extremely light and many mines have coal unbilled daily. Some are unable to work at times on account of no business, and yet in the face of all this there is a crying demand for coal outside of the Missouri zone line that cannot be met. It is freely admitted that the operators in western Missouri and the Kansas field cannot begin to take care of the demand for coal in their territory when the time comes, and yet with the surplus of coal in Illinois, that territory must suffer and the Illinois mines remain idle.

The price of coal was increased 5c. per ton retail. It should have been 15c., but on account of the decrease in the mine price of 10c. on May 25 it was evened up with a 5c. increase.

There is no smokeless coal of any kind or character coming in, with the exception of a little from Arkansas, which is not giving satisfaction.

The prevailing market is, per net ton f. o. b. mines:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump	$2.55@2.90	$2.55@2.70	$2.55@2.70
3x6-in. egg	2.55@2.90	2.55@2.70	2.55@2.70
2x3-in. nut	2.55@2.90	2.55@2.70	2.55@2.70
No. 2 nut	2.55@2.90	2.55@2.70	.....
No. 3 nut	2.55@2.90	2.55@2.70	.....
No. 4 nut	2.55@2.90	2.55@2.70	.....
No. 5 nut	2.05@2.20	2.05@2.20	.....
2-in. scrgs	2.05@2.20	2.05@2.20	.....
2-in. lump	.....	.....	2.20@2.40
3-in. lump	.....	.....	2.20@2.40
Steam egg	.....	.....	2.20@2.40
Mine run	.....	2.35@2.50	2.00@2.20
Washed:			
No. 1	2.55@2.90	2.55@2.90	.....
No. 2	2.55@2.90	2.55@2.90	.....
No. 3	2.55@2.90	2.55@2.90	.....
No. 4	2.55@2.90	2.55@2.90	.....
No. 5	2.05@2.20	2.05@2.20	.....

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